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GENERAL PURPOSE DATA CONVERSION PROGRAMS FOR THE PDP-12 COMPUTE--ETC(U)
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GENERAL PURPOSE DATA CONVERSION PROGRAMS
FOR THE PDP-12 COMPUTER

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November 1977

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Final Report, January 1976-January 1977

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NOTICES

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This report has been reviewed by the Information Office (OI) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER SAM-TR-77-25 ✓	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) GENERAL PURPOSE DATA CONVERSION PROGRAMS FOR THE PDP-12 COMPUTER		5. TYPE OF REPORT & PERIOD COVERED Final January 1976 - January 1977
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Kennith W. Stevens, B.S.		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS USAF School of Aerospace Medicine (BRP) ✓ Aerospace Medical Division (AFSC) Brooks Air Force Base, Texas 78235		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62202F 999305BR
11. CONTROLLING OFFICE NAME AND ADDRESS USAF School of Aerospace Medicine (BRP) Aerospace Medical Division (AFSC) Brooks Air Force Base, Texas 78235		12. REPORT DATE November 1977
		13. NUMBER OF PAGES 92
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/ DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) A/D Conversion D/A Conversion Data Acquisition PDP-12 Computer		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) An analog-digital conversion program has been written for the PDP-12 computer. A time code tape search unit has been interfaced with the computer to provide program control of an analog tape transport. A coordinated digital-analog program provides tape duplication, tape monitoring, and mapping of the digitized data.		

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GENERAL PURPOSE DATA CONVERSION PROGRAMS FOR THE PDP-12 COMPUTER

INTRODUCTION

The two programs described here are a direct result of a change in the batch processing system used at the USAF School of Aerospace Medicine. For several years a Philco 2000 computer was used to process analog-digital (A/D) data that had been converted by a Consolidated Systems Corporation MicroSadic A/D converter. With the change-over to an IBM-360/65, our A/D converter became incompatible. We then obtained a PDP-12 computer with a TU-10 tape transport as a replacement to the old conversion system.

The A/D conversion program was written first but with it came the need for a checkout procedure and/or program. Thus the digital-analog (D/A) conversion program began to emerge. Written first as just a tool to check out the A/D program, it soon became a means of looking at problem segments of data as well. Both programs have undergone a number of revisions; often a change in one created the need for a change in the other. Thus far we have been extremely pleased with the system that has evolved and feel that we have a much more flexible and reliable system than before.

This report discusses the capabilities, limitations, and operation of each program; lists the hardware and software requirements; and describes in detail the tape format.

HARDWARE AND SOFTWARE REQUIREMENTS

The A/D and D/A programs require the following hardware devices to be fully functional as described.

- 1 PDP-12 with 8K storage
- 2 AA-50 D/A converters
- 1 KW12-A clock
- 1 KF12B automatic priority interrupt
- 1 ASR-33 teletype
- 1 VR14 scope
- 2 TU-10 magnetic tape transports

- 1 TC-58 tape controller
- 1 Datum time code translator, model 9310
- 1 Datum tape search, model 9241

Both programs operate under the control of the KF12B automatic priority interrupt (API). The need arose within the A/D program to disable the teletype interrupts while the API is enabled, resulting in a slight modification to the PDP-12 hardware which is explained in the section "Analog-Digital Conversion Program." Another modification was made to the PDP-12 to change the full-scale voltage range from ± 1.0 volt to ± 1.414 volts, the full-scale voltage range of an analog tape signal.

Both the A/D and D/A programs were written in DIAL MS and reside in the lower 4K of memory. Both use the entire upper 4K to double buffer data; LINK Fields 4 and 5 serve as one data buffer and LINC Fields 6 and 7 serve as the other. A question-and-answer display subroutine is used to display the question-and-answer frames, and the A/D program uses a modified version of the Digital Equipment Corporation (DEC) TU-10 tape handler.

ANALOG-DIGITAL CONVERSION PROGRAM

The A/D conversion program (Appendix A) has the capability to digitize from 2 to 16 channels of analog signals and store the results on file-oriented IBM compatible 9-track tape. For each file, the user may assign identification parameters, choose the number of channels, specify the sampling frequency (within certain limitations), and either manually or with an external logic level, start and stop digitized segments. Also, if the analog signals are from analog tape with standard IRIG-B time code, the user may, either manually or with paper tape via the teletype, specify to the program start and stop times and a command to digitize a particular data segment. Additional data files may be added during successive digitizing sessions.

The program itself is easy to operate. The user must have only enough knowledge of DIAL MS to load the DIAL Monitor and then load the program from LINCtape. Once the program is in memory and running, the VR14 Scope will display the first of several frames with instructions and questions to be answered by the user.

Frame 1:

ANALOG TO DIGITAL

CONVERSION PROGRAM

(TYPE LINEFEED TO CONTINUE)

Self-explanatory.

Frame 2:

IS THE DIGITAL TAPE TRANSPORT
THE TU-10 OR THE DATUM?
(TYPE T OR D) . -
IS THE A/D TAPE NEW OR
USED? (TYPE N OR U). -
A/D REEL NO. - - - - -

In our laboratory we have a second PDP-12 with a Datum tape controller and Wang tape transport. This option specifies the proper software for the selected tape controller.

If the A/D tape contains previously digitized data that the user wishes to retain, he may, by specifying a "U," cause the program to position the tape immediately past the last end-of-file (EOF) mark. This positioning is done after the last question-and-answer frame has been completed.

When the A/D tape is processed on the IBM-360, the reel number must be specified and must match with the number entered here. It is important that this entry be correct.

Frame 3:

EXPERIMENTER - - - - -
EXPERIMENT ID - - - - -
PROJECT NUMBER - - - -
WILL CHANNEL Ø BE USED AS AN EDIT CHANNEL?
(TYPE Y OR N) -
NUMBER OF CHANNELS INCLUDING EDITS
(Ø2 - 16) - -
RUN SERIAL NUMBER - - - - -
STARTING GROUP NUMBER - - - -

ANALOG REAL TIME MULTIPLIER - -

SAMPLING FREQUENCY -

- | | | | |
|------------|-------------|-----------|----------|
| 1. 400 kHz | 2. 100 kHz | 3. 10 kHz | 4. 1 kHz |
| 5. 100 Hz | 6. EXTERNAL | | |

DIVIDED BY (1-4095) - - - -

The Experimenter and Experiment ID entries may contain up to 16 characters each; the contents should be self-explanatory.

The Project Number is a locally generated, 4-character cost accounting code that accompanies each project.

By typing a "Y", the user may specify that channel 0 be used as an Edit Channel. The state of each of the 12 sense lines is interrogated each time digital samples are taken (with each clock interrupt). For each sense line that is high, the corresponding accumulator bit is set, creating an edit word that is stored the same as a digital sample would be. This edit word gives the user the ability to preserve the state of 12 binary signals simultaneously with each sample of data. These signals may be from any device that gives a "HI" state of +3 volts and a "LO" state of 0 volts.

The Number of Channels needs little explanation except that a leading 0 should be included if the number is less than 10.

The Run Serial Number is an 8-digit number unique to this file in the form 60851105: the first digit denotes the year 1976; the next three digits, the Julian date; and the last four, the 24-hour time of day. With the IBM-360 software that has been created to handle A/D tapes, this is the number by which each file is referenced.

The Starting Group Number may be any number from 1 to 4095; since the maximum possible group number within a file is 4095, it is advisable to start with a smaller number. This option is provided for those who may want to keep the group numbers from one file to the next in sequence.

The Analog Real-Time Multiplier entry serves mainly as a record of the digitizing setup. As an example, if the data to be digitized is from an analog tape recorded at a speed of 3-3/4 inches per second (ips) and if the tape is to be reproduced at a speed of 15 ips at the time of digitizing, then it will be digitized at 4-times real time; thus the number 04 would be entered here. The number itself has no function; it serves only as a record, just as the Experimenter and Experiment ID entries.

The Sampling Frequency is determined by making two entries. The first entry specifies to the KW12-A clock which time base is to be used, or the rate at which the count pulses are provided to the counter register. The second entry, called the time-base divisor, specifies to the counter register the number of count pulses required for a clock interrupt. For example, if a sample frequency of 250 samples per second is desired, the first entry would be 4 and the second entry, 0004. If the Analog Real-Time Multiplier were 02, the real-time sampling frequency would be 125 samples per second.

Frame 4:

CHANNEL INFORMATION

```

00 - - - - -
01 - - - - -
02 - - - - -
    .
    .
    .
12 - - - - -

```

Here the contents of each channel should be described as accurately as possible within the 16 allotted characters.

Prior to typing the LINEFEED that signals the end of this question frame, the digital tape should be mounted on the TU-10 with the Unit Select switch set to unit 0. The tape should be queued and positioned to the load point and the On-Line switch set to the on-line position. Now, when the LINEFEED is typed, all the information specified in the last three frames is converted to EBCDIC format and stored in the first block of the data file as a header block. If a used tape is specified, the program spaces forward and positions the tape immediately prior to the last EOF mark and then writes the header block.

The program is now waiting to digitize a group of data. To start digitizing a group of data, bring sense line 0 high or to a logic one; to stop digitizing, bring it low or to a logic zero. This can be done with a clean logic signal from any source or from a debounced switch. Digitizing control may also be via the Datum Time Code Translator and Tape Search units. The controller should be in the Remote mode, and, provided the switches describing the tape speed are set correctly, the analog tape unit may be controlled by the A/D program.

Nine commands are available; three of which will cause the program to digitize data. To use these commands type a LINEFEED

followed by the 2-letter mnemonic command, followed by a space, then the start and stop times separated by a dash, then a RETURN.

Example:

→ SC 2:56-1:00:25 ↓

The space, dash, and colons are all critical. They are recognized as delimiting characters by the computer and must be used. Notice that the first time given does not specify 00 hours; you do not have to type leading zeros, i.e., type only the times required.

Next is a list of the commands and their functions.

→ SC time A - time B ↓

Single Cycle - The tape advances forward in search mode to time A, then the data between times A and B is digitized as one group. The analog tape stops at time B.

→ RC time A - time B ↓

Recycle - The tape advances forward in the search mode to time A, then the data between times A and B is digitized as one group. Then the analog tape reverses in fast reverse and reproduces between times A and B again. This cycle continues until another command is given.

→ CN time A - time B ↓

Continuous - The tape reproduces forward, and the data between time A and B is digitized as one group when it is encountered. The analog tape continues to reproduce forward until another command is given.

→ SS time A - ↓


Search to Start - The tape searches forward and stops positioned just before time A.

→ FD ↓


Forward - The tape reproduces forward until another command is issued.

→ RV ↓


Reverse - The tape reproduces backward until another command is issued.

→ FF 

Fast Forward - The tape advances fast forward until another command is issued.

→ FR 

Fast Reverse - The tape reverses in fast reverse until another command is issued.

→ SP 

Stop - The tape motion stops regardless of the digitizing state or any previous command.

A list of these digitizing commands can be prepared in advance and placed on paper tape, then read in at the time of digitizing.

When a command is given that will cause digitizing to take place, the Datum tape search unit must be allowed to complete the entire cycle of operation before another tape command can be accepted. The teletype interrupt must be disabled while this cycle is taking place, or it will continue to accept characters from the paper tape. Since the machine is normally structured in such a way that the teletype interrupt cannot be disabled while the API is on, a hardware modification was required to provide this feature.

When the program begins a group of data, relay 0 of the 6 DPDT relays is switched on. When the group ends, the relay is switched off. In our laboratory this function is primarily used to start and stop an 8-channel oscillograph recorder.

When all the data for a particular file has been digitized, the file should be terminated either by typing CTRL F for EOF or CTRL T for EOT. Typing a CTRL F indicates that the data file is ended but another is to be created, and an additional question frame appears on the screen.

Frame 5:

WILL THE PARAMETERS FROM THE PREVIOUS FILE BE USED AGAIN:

IF SO TYPE A NEW RUN SERIAL NUMBER - - - - -

AND STARTING GROUP NUMBER - - - -

If the Experimenter, Experiment ID, Number of Channels, Sampling Frequency, Channel Contents, etc., are to be the same for the next file, then by inserting the new Run Serial Number and Starting Group Number the user can avoid answering the questions in Frames 3 and 4

again. However, by typing only a LINEFEED, the program returns to Frame 3, and the entire procedure from that point on will be the same as described above.

Typing a CTRL T terminates the digital tape. The program writes an EOT mark, rewinds the tape, and returns control to the DIAL Monitor.

SPECIFICATIONS

Sampling Interval

The sampling interval is provided by the KW12-A clock and is program selectable by specifying the time base and presetting the clock counter register during Frame 3 of the question-and-answer session. The program is limited to a maximum sampling frequency of 3500 samples per second/channel when in the 2-channel mode, and to 700 samples per second/channel when in the 16-channel mode. Notice that maximum sampling frequency is not directly proportional to number of channels digitized. The reason for this is that the TC-58 tape controller has a maximum transfer rate of 36 kHz, each transfer requiring three machine cycles to complete. Thus, as the sampling interval gets smaller, the clock interrupts run a greater risk of interference by the tape controller as it steals cycle time from the central processor. See Appendix B for a list of maximum sampling frequencies.

Optionally the time base may be provided from an external source via the Schmitt Trigger input. This is ideal in cases where sampling is to be asynchronous or where the sampling interval desired cannot be provided with any combination of the time base and clock counter register.

With the use of an external time base, the program is not limited to a minimum sampling frequency.

Skew

The program enables the fast sample function so that when each SAM command is given, the results of the previous SAM command are delivered to the accumulator. When the transfer is complete, the new channel number is specified and the new conversion is initiated. There is a 14.5 μ sec delay from the time this new conversion is initiated until the sample is assembled in the converter buffer. Therefore, there is a constant skew of 14.5 μ sec from one channel to the next. Total skew across all channels is a function of the number of channels; it will be only 14.5 μ sec for two channels and 218 μ sec from the first to the last channel when in the 16-channel mode. This might be somewhat disturbing unless you consider that in

the 16-channel mode, 218 μ sec is only 15% of the sample interval when sampling at the maximum frequency of 700 samples per second. When in the 2-channel mode, 14.5 μ sec is only 5% of the sample interval when sampling at the maximum frequency of 3500 samples per second.

Also, it should be mentioned here that during this 14.5 μ sec delay, the number (the value of the previous conversion) in the accumulator is converted from one's complement to two's complement and stored in an intermediate buffer area. Also, if it is one of the first 12 channels, it is converted back to an analog signal with the D/A converter. This provides the user with the ability to monitor the digital signal as it is being sampled.

Resolution and Voltage Range

Since most of the A/D conversion work in our laboratory involves signals from analog tape, it was decided that the 10 bits available from the A/D converter should represent a full-scale analog tape signal as mentioned earlier. Thus we have ± 512 digital counts representing ± 1.414 V. This yields 2.76 mV per bit of resolution.

TAPE FORMAT

A digitized tape is made up of one or more data files with each file containing at least one group. A group consists of one or more blocks, the length of which is determined by the number of digitized channels. See Appendix B for a list of block lengths. The first group of each file is only one block long, and contains header information in EBCDIC format pertinent to that data file. This header block is always numbered as group number 0. The next group will be the first to contain actual data values. A file is terminated with an EOF mark and an extended record gap. A tape is terminated with an end-of-tape (EOT) mark that consists of two consecutive EOF marks.

Digitized values are stored on tape in frames. One frame consists of the digital values taken from each analog channel for a particular clock interrupt. Thus, if the program is operating in the 2-channel mode, the first data frame will contain digital values from channel 0 and channel 1. The first frame of each block contains the group number, and the second frame begins the data.

One digitized value is stored on tape as two 8-bit bytes. Since the PDP-12 word length is 12 bits, the program breaks the value up and stores the high-order 4 bits in one byte and the low-order 8 bits in the next byte. Therefore, in the 2-channel mode, one data frame consists of 4 bytes.

Header Block Layout

Byte Number	Content	Remarks
0-1	020 000	Group 0: always denotes header block. (The bit that is set causes the group number to read 4096 + group #. This is a positive number larger than the A/D converters can produce and can be easily detected from actual data.)
2-3	000 001	Block count; resets with each file, therefore, the header block is always block number 1.
4	012	A nonprintable EBCDIC character used as a filler.
5	<u>T</u> or <u>D</u>	Denotes the tape transport used--the Datum or the TU-10.
6	012	Filler
7	<u>N</u> , <u>U</u> , or <u>C</u>	For new, used, or copied tape
8	012	Filler
9-14	Tape No. (HB 1109, etc.)	6 digits
15	012	Filler
16-17	000	
18	012	Filler
19-34	Experimenter	16 digits
35	012	Filler
36-51	Experiment Identif.	16 Digits
52	012	Filler
53-56	Project Number	The local project classification number, 4 digits.
57	012	Filler

58	Y or N	Yes or No if channel 0 is to be used as a channel of edits.
59	012	Filler
60-61	No. of Channels (2-16)	2 digits
62	012	Filler
63-70	Not used	
71	012	Filler
72-75	Starting Gp No. (1-4095)	4 digits
76	012	Filler
77-78	Real-time Multiplier	2 digits
79	012	Filler
80	Time-Base Code for Sampling Frequency	1 digit
81	012	Filler
82-85	Time-Base Divisor (1-4095)	4 digits
86	012	Filler
87	000	Blank
88	012	Filler
89-104	Channel 0 Description	
105	012	Filler
106-121	Channel 1 Description	
122	012	Filler
123-138	Channel 2 Description	

139	Ø12	Filler
14Ø-155	Channel 3 Description	
156	Ø12	Filler
157-172	Channel 4 Description	
173	Ø12	Filler
174-189	Channel 5 Description	
19Ø	Ø12	Filler
191-2Ø6	Channel 6 Description	
2Ø7	Ø12	Filler
2Ø8-223	Channel 7 Description	
224	Ø12	Filler
225-24Ø	Channel 8 Description	
241	Ø12	Filler
242-257	Channel 9 Description	
258	Ø12	Filler
259-274	Channel 1Ø Description	
275	Ø12	Filler
276-291	Channel 11 Description	
292	Ø12	Filler
293-3Ø8	Channel 12 Description	
3Ø9	Ø12	Filler
31Ø-311	175	A unique character signaling the end of the channel descriptions.
312-1ØØ9	Unassigned	

The following are in binary format and are used only in the A/D and D/A programs.

1010-1011	Record length or block size.
1012-1013	Starting address of the block.
1014-1015	Number of bytes skipped within a LINC Field before a record begins.
1016-1017	Starting address of first frame of data.
1018-1019	Starting address of group numbers.
1020-1021	The negative number of channels.
1022-1023	The number of channels.

Data Block Layout

Example of a tape block with three channels of data.

Frame 341-- Last frame of preced- ing block	Channel 0	xxx	High Order Byte	
		xxx	Low Order Byte	
	Channel 1	yyy	HOB	
		yyy	LOB	
	Channel 2	zzz	HOB	
		zzz	LOB	
	InterRecord Gap			
Frame 1	Group Number	020	HOB	In this case, Group Number equals 5.
		005	LOB	
	Block Count	006	HOB	In this case, Block Count equals 1791.
		377	LOB	
	Group Number	020	HOB	
		005	LOB	
Frame 2	Channel 0	xxx	HOB	
		xxx	LOB	
	Channel 1	yyy	HOB	
		yyy	LOB	
	Channel 2	zzz	HOB	
		zzz	LOB	
Frame 3	Channel 0	xxx	HOB	
		xxx	LOB	
	Channel 1	yyy	HOB	
		yyy	LOB	
	Channel 2	zzz	HOB	
		zzz	LOB	
	,			
	,			
	,			

DIGITAL-ANALOG CONVERSION PROGRAM

The D/A conversion program (Appendix C) provides essentially the inverse of the A/D process. It has the capability of reading a digitized tape created by the A/D program and converting up to 12 consecutive channels back to analog form. The program prints a map of the digitized tape, via the teletype, that contains for each data file the header block information inserted at the time of digitizing as well as each group number and starting block number of each group. Just as with the A/D program, the user may specify to the D/A program the frequency of the conversion process. The program can also make a duplicate tape if the user wishes.

As with the A/D program, the user must load the Dial Monitor and then load the program from LINCtape. Once the program is in memory and running, the scope will display the first of two frames.

Frame 1:

DIGITAL TO ANALOG
RETURN PROGRAM
(TYPE LINEFEED TO CONTINUE)

Self explanatory.

Frame 2:

WILL A COPY BE MADE?
IF SO TYPE C. -
AND NEW REEL NO. - - - - -
RETURN FREQUENCY -
(FRAMES PER SECOND).
1. 400 kHz 2. 100 kHz 3. 10 kHz 4. 1 kHz
5. 100 Hz 6. EXTERNAL
DIVIDED BY (1-4095) - - - -

If the user wishes to have a duplicate tape, he should type a "C" followed by the duplicate's reel number. When the program begins the conversion process, it will read from unit 0 and duplicate onto unit 1. An exact duplicate will be made with two exceptions: That area of the header block that normally contains an "N" or "U" to specify a new or used tape will now contain a "C" to specify a copied

tape; that area that contains the A/D reel number will contain the duplicate reel number.

The entries for the Return Frequency are exactly like those for the Sampling Frequency in Frame 3 of the A/D program. As with the A/D program, the maximum conversion frequency is a function of the number of channels being converted. If no copy is to be made, the maximum frequency is the same as the A/D program. However, if a copy is to be made, then the tape controller will need twice as much cycle time for transfer operations; and the maximum frequency will be approximately 20% less for each channel mode.

After the LINEFEED is typed to end Frame 2, the program reads the first block of data, which will be a header block formatted in EBCDIC, does an EBCDIC-to-ASCII conversion, and prints the header information as the first part of the map. When this is completed, it begins the D/A conversion process, typing each group number and starting block number as encountered. Since the computer is equipped with only 12 D/A modules, the first twelve (0-11) digital tape channels are converted. Channels 1-12 may be converted by setting sense switch 5; channels 2-13, by setting sense switch 4; channels 3-14, by setting sense switches 4 and 5; and channels 4-15, by setting sense switch 3. As the D/A conversion takes place the user may, by typing CTRL G, cause the program to read forward at the maximum tape speed to the next group; and by typing CTRL F, cause the program to read forward at the maximum speed to the next file. Copying will not be interfered with in either case.

Relay 0 is switched on at the beginning of each group and off at the end of each group. As new files are encountered, as part of the map, the program prints EOF and the number of the last data block in the previous file. When the EOT mark is encountered, the program rewinds the digital tape or tapes and returns control to the DIAL Monitor.

CONCLUSIONS

The two programs described in this paper have vastly streamlined our A/D conversion work. The A/D program's ability to locate and digitize specific segments of data from analog tape at multiple playback speeds has enabled large volume jobs to be completed in hours or minutes instead of days. The concept of a header block with each data file has been beneficial in preventing mistakes as A/D tapes are analyzed. The header block contains pertinent information describing the data as well as unique identifiers to assure that the proper file has been located.

Although the D/A program was not given as much attention in the paper as the A/D program, it is a vital part of the system. The

ability to make a slow D/A conversion of a problem segment of data that was digitized at a high sampling frequency is a valuable debugging aid. An available duplicate tape has proven to be worthwhile; occasionally we have called a duplicate tape into service when tape failures rendered the original useless. The information that the map produces is also very useful.

In general the system has served our needs well, is used often, is efficient, and is capable of more than has been demanded of it.

APPENDIX A
A/D PROGRAM LISTING


```

0000      *20
0001      /KWSATUD7  14 JAN 77
0002      /ANALOG TO DIGITAL CONVERSION PROGRAM
0003      /
0004      /KENNITH W. STEVENS
0005      /
0006      /
0007      PMODE
0010      /API COMMANDS.
0011      APION=6006
0012      PUSHJ=6760
0013      NEST=6771
0014      SMLV=6772
0015      RFLD=6773
0016      NSTK=6774
0017      RVEC=6775
0020      SSTK=6776
0021      SVEC=6777
0022      /END OF API COMMANDS.
0023      *100
0024      0100  4000  K04000, 4000
0025      0101  0010  K0010, 0010
0026      0027      0102  0420  CLOCK=JMS I.
0030      CLK
0031      0103  0403  API=JMS I.
0032      0104  4305  INTRPT
0033      0105  5643  TTAPE, WRITAP
0034      0106  4305  ITAPE, JTAPE
0035      0107  0243  RTAPE, WRITAP
0036      0110  0710  INT, PDL +1
0037      0111  0001  STUS, STATUS
0040      TFLAG, 1
0041      /MAGTAPE COMMANDS.
0042      0112  0600  IBM=JMS I.
0043      TUI0
0044      KEWIND=0010
0045      HEAD=0020
0046      NBYTE=0030
0047      WRITE=0040
0050      TM=0150
0051      SPACEF=0060
0052      SPACEB=0070
0053      GAP=0100
0054      /END OF MAGTAPE COMMANDS
0055      *200
0056      /INTERRUPT VECTOR TABLE.
0057      0200  7000  VECT,  NOP
0058      0201  7402  HLT          /PFW POWER FAIL
0059      0202  7000  NOP
0060      0203  7402  HLT          /LINC TAPE
0061      0204  5605  JMP I,+1
0062      0205  0236  VECCLK, ADOFF /KW12A CLOCK
0063      0206  7000  NOP
0064      0207  7402  HLT          /(TSS) TIME SHARE
0065      0210  5611  JMP I,+1
0066      0211  5055  TTY          /TTY PRINTER (YOURS)
0067      0212  5613  JMP I,+1
0070      0213  4706  KBRD        /TTY KYBD (YOURS)
0071      0214  7000  NOP
0072      0215  7402  HLT          /TTY REMOTE (KYBD)
0073      0216  7000  NOP
0074      0217  7402  HLT          /TTY REMOTE (PRT)
0075

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0076	0220	7000	NOP	
0077	0221	7402	HLT	/PLOTTER
0100	0222	5623	JMP I.+1	
0101	0223	0674	MAGTAP	/MAGTAPE
0102	0224	5625	JMP I.+1	
0103	0225	0240	FPPOFF	
0104	0226	7000	NOP	
0105	0227	7402	HLT	/"
0106	0230	5631	JMP I.+1	
0107	0231	0674	MAGTAP	/WANG MAGTAPE.
0110	0232	7000	NOP	
0111	0233	7402	HLT	/"
0112	0234	7000	NOP	
0113	0235	7402	HLT	
0114			/	
0115			/	END OF VECTOR TABLE
0116			/	
0117	0236	6135	ADOFF, CLSA	/INTERRUPTS TO HERE
0120	0237	6771	REST	/WHEN NOT DIGITIZING.
0121	0240	6552	FPPOFF, 6552	
0122	0241	6771	REST	
0123	0242	0000	PDL, 0	/START OF PUSH DOWN LIST.
0124			/	
0125			/	
0126				*400
0127			/	
0130			/	
0131	0400	0200	AVECT, VECT	/SET UP PUSH DOWN LIST.
0132	0401	0242	APDL, PDL	
0133	0402	0037	K0037, 0037	
0134	0403	0000	INTRPT, 0	
0135	0404	7200	CLA	
0136	0405	1202	TAD K0037	
0137	0406	6772	SMLV	
0140			/	
0141			/	PUSH DOWN LIST IS IN LOW 4K
0142			/	VECTOR FIELD IS IN LOW 4K
0143			/	ALL INTERRUPTS ARE PERMITTED
0144			/	
0145	0407	7200	CLA	
0146	0410	1201	TAD APDL	
0147	0411	6776	SSTK	
0150			/	
0151			/	PUSH DOWN STACK IS IN
0152			/	PMODE PAGE 1 FIELD 0
0153			/	PDL=400
0154			/	THIS SHOULD ALLOW UP TO 19
0155			/	PENDING INTERRUPTS
0156			/	
0157	0412	7200	CLA	
0160	0413	1200	TAD AVECT	
0161	0414	6777	SVEC	
0162			/	
0163	0415	7200	CLA	
0164	0416	6006	APION	
0165	0417	5603	JMP I INTRPT	
0166			/	VECTOR TABLE ADDRESS IS
0167			/	VECT
0170			/	
0171			/	
0172			/	
0173			/	
0174			/	

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0175      /      KW12A CLOCK HANDLER
0176      /
0177      /
0200      /
0201      0420  0000  CLK,  0
0202      0421  7300      CLA CLL      /START THE CLOCK.
0203      0422  6133      CLAB
0204      0423  6132      CLLR
0205      0424  6135      CLSA
0206      0425  7200      CLA
0207      0426  1243      TAD K0100
0210      0427  6132      CLLR
0211      0430  6135      CLSA
0212      0431  7200      CLA
0213      0432  1244      TAD NUMBER      /SET UP CLOCK BUFFER
0214      0433  6133      CLAB      /PRESET THE BPR FOR C
0215      0434  7200      CLA
0216      0435  1246      TAD K0300
0217      0436  6134      CLEN      /LOAD CK ENABLE
0220      0437  7200      CLA
0221      0440  1245      TAD K5100
0222      0441  6132      CLLR
0223      0442  5620      JMP I CLK
0224      /
0225      /NUMBER, IS THE COUNTS BEFORE INTERRUPT
0226      /
0227      /K5100, IS THE CLOCK CONTROL REG.
0230      /
0231      /K0300, SETS THE INTERRUPT ENABLE
0232      /
0233      /K0100, USED TO GET A MODE CHANGE
0234      /
0235      0443  0100  K0100,  0100
0236      0444  4575  NUMBER,  -3203
0237      0445  2100  K5100,  2100
0240      0446  0300  K0300,  0300
0241      /
0242      /
0243      /
0244      *600
0245      /
0246      /      TU10 TAPE HANDLER
0247      /
0250      /      28 JAN 1974
0251      /
0252      /
0253      MTSF=6701
0254      /SKIP ON ERNOR FLAG, OR MAGNETIC TAPE FLAG
0255      /
0256      MTCH=6711
0257      /SKIP ON T.C. READY
0260      /
0261      MTTN=6721
0262      /SKIP ON T.T. READY
0263      /
0264      MTAF=6712
0265      /CLEAR REGISTERS AND FLAGS
0266      /
0267      MTRC=6724
0270      /INCLUSIVE "OR" C(CR) TO C(AC)
0271      /
0272      MTCH=6714
0273      /INCLUSIVE "OR" C(AC) TO C(CR)

```



```

0274      /BITS 0-5 AND 9-11, JAM BITS 6,7,8 TO AC
0275      /
0276      MTLG=6716
0277      /LOAD COMMAND REGISTER
0300      /
0301      XXXX=6704
0302      /INCLUSIVE "OH" C(S,R.) TO C(AC)
0303      /
0304      MTRS=6706
0305      /READ STATUS REGISTER
0306      /
0307      MTGO=6722
0310      /MAG TAPE GO
0311      /
0312      MCLA=6702
0313      /CLEAR AC
0314      /
0315      /
0316      /
0317      /      ERROR CODES IN AC
0320      /
0321      /      0. ERROR FLAG TOTAL
0322      /      1. TAPE REWINDING
0323      /      2. BEGINNING OF TAPE (BOT)
0324      /      3. ILLEGAL COMMAND
0325      /      4. PARITY (LATERAL OR LONGITUDAL)
0326      /      5. END OF FILE (EOF)
0327      /      6. END OF TAPE (EOT)
0330      /      7. READ/COMPARE ERROR
0331      /      8. RECORD LENGTH INCORRECT
0332      /          WC=0 LONG
0333      /          WC=/0 SHORT
0334      /      9. DATA REQUEST LATE
0335      /      10. BAD TAPE
0336      /      11. JOB DONE (MTF)
0337      /
0340      /
0341      /
0342      0600 0000      TU10, 0      /C(AC)=BUF FIELD
0343      0601 3305      UCA WHERE
0344      0602 1111      TAD TFLAG
0345      0603 7450      SNA
0346      0604 5202      JMP .-2
0347      0605 7200      CLA
0350      0606 3111      UCA TFLAG
0351      0607 6214      HOF
0352      0610 1311      TAD KCIF
0353      0611 3272      UCA REFSET
0354      0612 6721      MTTW
0355      0613 5212      JMP .-1
0356      0614 1600      TAD I TU10      /GET COMMAND
0357      0615 3307      UCA COMMND
0360      0616 1307      TAD COMMND
0361      0617 0312      AND MASK
0362      0620 7112      CLL RTR
0363      0621 7010      HAR
0364      0622 1225      TAD .+3
0365      0623 3224      UCA .+1
0366      0624 7000      NOP
0367      /
0370      /
0371      /      A COMMAND OF "0" WILL HANG
0372      /      THIS CAN EASE SOME DEBUG PROBLEMS

```

0373	0625	5225	JMP	.
0374	0626	5250	JMP	REWIN
0375	0627	5254	JMP	READWR
0376	0630	5243	JMP	SETCNT
0377	0631	5254	JMP	READWR
0400	0632	5252	JMP	EOF
0401	0633	7000	PACF,	NOP
0402	0634	3305	PACB,	UCA WHERE
0403	0635	2200		ISZ TU10
0404	0636	1600		TAD I TU10
0405	0637	7041		LIA
0406	0640	3306		UCA COUNT
0407	0641	5260		JMP MAG3
0410	0642	6771		NEST
0411	0643	2200	SETCNT,	ISZ TU10
0412	0644	1600		TAD I TU10
0413	0645	7041		LIA
0414	0646	3306		UCA COUNT
0415	0647	5271		JMP RETA
0416	0650	3305	REWIN,	UCA WHERE
0417	0651	5262		JMP MAG4
0420	0652	3305	EOF,	UCA WHERE
0421	0653	5262		JMP MAG4
0422			/	REWIND=EOF CODE, BUT ERRORS DIFFER
0423	0654	2200	READWR,	ISZ TU10
0424	0655	7240		CLA CMA
0425	0656	1600		TAD I TU10
0426	0657	3716		UCA I TAPEK
0427	0660	1306	MAG3,	TAD COUNT
0430	0661	3717		UCA I TAPEK+1
0431	0662	1307	MAG4,	TAD COMMND
0432	0663	0313		AND MASK+1
0433	0664	1320		TAD KCOM
0434	0665	6716	MAG5,	MTLC
0435	0666	7200		CLA
0436	0667	1305		TAD WHERE
0437	0670	6722		MTGO
0440	0671	2200	RETA,	ISZ TU10
0441	0672	6202	REFSET,	CIF 0
0442	0673	5600		JMP I TU10
0443	0674	6706	MAGTAP,	MTRS
0444	0675	6712		MTAF
0445	0676	3310		UCA STATUS
0446	0677	1310		TAD STATUS
0447	0700	7510		SPA
0450	0701	7000		NOP
0451	0702	2111		ISZ TFLAG
0452	0703	6771		NEST
0453	0704	7402		MLT
0454	0705	0000	WHERE,	0
0455	0706	0000	COUNT,	0
0456	0707	0000	COMMND,	0
0457	0710	0000	STATUS,	0
0460	0711	6202	KCIF,	6202
0461	0712	0070	MASK,	0070
0462	0713	0370		0370
0463	0714	0606		0606
0464	0715	0100		0100
0465	0716	7753	TAPEK,	7753
0466	0717	7752		7752
0467	0720	0407	KCOM,	0407
0470	0721	7773	MKS,	-5
0471			/	

/NO ERROR CHECK

/SPACE

/REWIND

/LOAD COMMAND

/STATUS

/SET UP FOR RETRY

/BUFFER FIELD

/READWR ERROR
/EOF

```

0472      *777
0473      DATUM
0474      /
0475      /
0476      / NO ERROR CHECK FOR
0477      / 1. SPACE FORWARD
0500      / 2. SPACE BACK
0501      / 3. REWIND
0502      / 4. READ EOM/?
0503      /
0504      /
0505      /
0506      / PAGE 2
0507      / HOOKS TO SETUP THE DATUM
0510      /
0511      1000 0000 SETDAT, 0
0512      1001 2200 ISZ SETDAT
0513      1002 7200 CLA
0514      1003 1212 TAD KJMS
0515      1004 3613 UCA I KJMS+1
0516      1005 1214 TAD KJMS+2
0517      1006 3615 UCA I KJMS+3
0520      1007 1217 TAD K0004
0521      1010 3616 UCA I KJMS+4
0522      1011 5600 JMP I SETDAT
0523      1012 4777 KJMS, 4777 /JMS I P 177
0524      1013 0601 TU10+1
0525      1014 0604 0604
0526      1015 0714 MASK+2
0527      1016 0720 KCOM /COMMAND CONSTANT
0530      1017 0004 K0004, 4
0531      1020 0000 DATUM, 0
0532      1021 7112 CLL RTR /MOVE FIELD POINTER
0533      1022 7010 RAR /TO BITS 9, 10, 11, AND
0534      1023 6717 6717 /SETS PROPER DATA FIELD
0535      1024 5620 JMP I DATUM /FOR DATUM TRANSPORT.
0536      /
0537      / END OF TAPE HANDLER
0540      /
0541      LMODE
0542      SEGMENT 1
0543      *20
0544      /QANDA1 COMMANDS
0545      QU=JMP 1000
0546      UR=JMP 1063
0547      /
0550      /END OF QANDA1 COMMANDS
0551      0020 0643 DISPLA, LDF 3 /THIS IS THE PORTION
0552      0021 7000 QU /OF THE PROGRAM THAT
0553      0022 3000 MESS012000 /DISPLAYS THE QUESTION
0554      0023 0016 NOP /AND ANSWERS ON THE
0555      0024 7063 UR /SCREEN.
0556      0025 7000 QU
0557      0026 3107 MESS112000
0560      0027 2001 ANS112000
0561      0030 7063 UR
0562      0031 1000 LDA
0563      0032 2002 2002
0564      0033 0642 LDF 2
0565      0034 1040 STA
0566      0035 3665 TYPET12000
0567      0036 6053 JMP CONT
0570      0037 0643 RESTR, LDF 3

```

0571	0040	7000	QU	
0572	0041	5217	MESS212000	
0573	0042	2036	ANS212000	
0574	0043	7063	QR	
0575	0044	1000	LDA	
0576	0045	2036	2036	
0577	0046	1460	SAE I	
0600	0047	7400	7400	/SKIP IF NEW PARAMETERS,
0601	0050	6052	JMP .+2	
0602	0051	6053	JMP CONT	
0603	0052	6434	JMP HEADER	
0604	0053	0643	LDF 3	
0605	0054	7000	QU	
0606	0055	5320	MESS312000	
0607	0056	2010	ANS312000	
0610	0057	7063	QR	
0611	0060	7000	QU	
0612	0061	3607	MESS412000	
0613	0062	2053	ANS412000	
0614	0063	7063	QR	
0615	0064	1000	LDA	/END OF QUESTION AND
0616	0065	2001	2001	/ANSWER SESSION.
0617	0066	1460	SAE I	/THIS CODING INTERROGATES
0620	0067	7404	7404	/THE VARIOUS ANSWER
0621	0070	6075	JMP .+5	/FIELDS AND SETS UP
0622	0071	0002	PDP	/CERTAIN PARAMETERS.
0623			Pmode	
0624	2072	4673	JMS I,+1	
0625	2073	1000	SETDAT	
0626	2074	6141	LINC	
0627			Lmode	
0630	0075	1000	LDA	
0631	0076	2047	2047	
0632	0077	1560	BCL I	
0633	0100	6077	6077	
0634	0101	0243	KUL 3	
0635	0102	1120	ADA I	
0636	0103	0100	100	
0637	0104	0640	LDF 0	
0640	0105	1040	STA	
0641	0106	2445	K510012000	
0642	0107	1460	SAE I	
0643	0110	6100	6100	
0644	0111	6115	JMP .+4	
0645	0112	1020	LDA I	
0646	0113	0320	0320	
0647	0114	6117	JMP .+3	
0650	0115	1020	LDA I	
0651	0116	0300	0300	
0652	0117	1040	STA	
0653	0120	2446	K030012000	
0654	0121	0643	LDF 3	
0655	0122	1020	LDA I	/LOAD HALF WORD ADDRESS
0656	0123	6047	6047	/OF NUMBER TO BE
0657	0124	6403	JMP DECBIN	/CONVERTED TO BINARY.
0660	0125	0017	COM	
0661	0126	1120	ADA I	
0662	0127	0001	0001	
0663	0130	0640	LDF 0	
0664	0131	1040	STA	
0665	0132	2444	NUMBER12000	
0666	0133	0643	LDF 3	
0667	0134	1000	LDA	/LOAD NUMBER OF

0670	0135	2035	2035	/CHANNELS.
0671	0136	0642	LDF 2	
0672	0137	1040	STA	
0673	0140	3741	CHAN12000	
0674	0141	0011	CLR	
0675	0142	1040	STA	
0676	0143	3740	MCHAN12000	
0677	0144	1020	LDA I	
0700	0145	7737	IXSEVN16000	
0701	0146	6403	JMP DECHIN	/STORE NO. OF CHANNELS.
0702	0147	1040	STA	
0703	0150	3741	CHAN12000	
0704	0151	0017	COM	/NEGATIVE NO. OF CHANNELS.
0705	0152	1040	STA	
0706	0153	3740	MCHAN12000	
0707	0154	0241	KOL 1	
0710	0155	4161	STC TEMP3	
0711	0156	1020	LDA I	
0712	0157	4000	4000	
0713	0160	1120	ADA I	
0714	0161	0000	TEMP3, 0	
0715	0162	0471	APD I	
0716	0163	6160	JMP .-3	
0717	0164	0470	AZE I	
0720	0165	6172	JMP .+5	
0721	0166	1100	ADA	
0722	0167	3741	CHAN12000	
0723	0170	1100	ADA	
0724	0171	3741	CHAN12000	
0725	0172	1040	STA	
0726	0173	3735	KCDSP12000	
0727	0174	0017	COM	
0730	0175	1120	ADA I	
0731	0176	4000	4000	
0732	0177	1040	STA	
0733	0200	6102	KCDSP12000	
0734	0201	1040	STA	
0735	0202	3733	KCDSP12000	
0736	0203	1000	LDA	
0737	0204	3735	KCDSP12000	
0740	0205	1120	ADA I	
0741	0206	3777	3777	
0742	0207	1560	BCL I	
0743	0210	4000	4000	
0744	0211	1620	BSE I	
0745	0212	2000	2000	
0746	0213	1040	STA	
0747	0214	3737	IXSEVN12000	
0750	0215	1100	ADA	
0751	0216	3741	CHAN12000	
0752	0217	1100	ADA	
0753	0220	3741	CHAN12000	
0754	0221	1560	BCL I	
0755	0222	4000	4000	
0756	0223	1620	BSE I	
0757	0224	2000	2000	
0760	0225	1040	STA	
0761	0226	3736	IXTEN12000	
0762	0227	0643	LDF 3	
0763	0230	1000	LDA	
0764	0231	2034	2034	
0765	0232	0642	LDF 2	
0766	0233	1560	BCL I	

0767	0234	1677	1677	
0770	0235	0470	AZE I	/WILL CHANNEL 0 BE USED FOR EDITS?
0771	0236	6242	JMP .+4	/NO.
0772	0237	1020	LDA I	/YES, MAKE APPROPRIATE PATCH.
0773	0240	0016	NOP	
0774	0241	6244	JMP .+3	
0775	0242	1020	LDA I	
0776	0243	6542	JMP UNPAK	
0777	0244	1040	STA	
1000	0245	2473	JSW112000	/INITIALIZE FOR 16 CHANNELS.
1001	0246	1020	LDA I	
1002	0247	0016	NOP	
1003	0250	1040	STA	
1004	0251	2341	TWOCHN12000	
1005	0252	1040	STA	
1006	0253	2350	THRCHN12000	
1007	0254	1040	STA	
1010	0255	2357	FORCHN12000	
1011	0256	1040	STA	
1012	0257	2366	FIVCHN12000	
1013	0260	1040	STA	
1014	0261	2375	SIXCHN12000	
1015	0262	1040	STA	
1016	0263	2404	SEVCHN12000	
1017	0264	1040	STA	
1020	0265	2413	EHTCHN12000	
1021	0266	1040	STA	
1022	0267	2422	NINCHN12000	
1023	0270	1040	STA	
1024	0271	2431	TENCHN12000	
1025	0272	1040	STA	
1026	0273	2440	ELVCHN12000	
1027	0274	1040	STA	
1030	0275	2447	TWLCCHN12000	
1031	0276	1040	STA	
1032	0277	2454	TRTCHN12000	
1033	0300	1040	STA	
1034	0301	2461	FRTCHN12000	
1035	0302	1040	STA	
1036	0303	2466	FFTCHN12000	
1037	0304	0011	CLR	/THE FOLLOWING CODING
1040	0305	1100	ADA	/SETS UP THE CORRECT
1041	0306	3741	CHAN12000	/NUMBER OF CHANNELS
1042	0307	0241	ROL 1	/TO DIGITIZE.
1043	0310	1120	ADA I	
1044	0311	6312	JMP .+1	
1045	0312	4315	STC JMPADR	
1046	0313	1020	LDA I	
1047	0314	6473	JMP JSW1	
1050	0315	0000	JMPADR, 0	
1051	0316	1040	STA	
1052	0317	2341	TWOCHN12000	
1053	0320	1040	STA	
1054	0321	2350	THRCHN12000	
1055	0322	1040	STA	
1056	0323	2357	FORCHN12000	
1057	0324	1040	STA	
1060	0325	2366	FIVCHN12000	
1061	0326	1040	STA	
1062	0327	2375	SIXCHN12000	
1063	0330	1040	STA	
1064	0331	2404	SEVCHN12000	
1065	0332	1040	STA	

1066	0333	2413	ENTCHN12000	
1067	0334	1040	STA	
1070	0335	2422	NINCHN12000	
1071	0336	1040	STA	
1072	0337	2431	TENCHN12000	
1073	0340	1040	STA	
1074	0341	2440	ELVCHN12000	
1075	0342	1040	STA	
1076	0343	2447	TWLCHN12000	
1077	0344	1040	STA	
1100	0345	2454	TRTCHN12000	
1101	0346	1040	STA	
1102	0347	2461	FRTCHN12000	
1103	0350	1040	STA	
1104	0351	2466	FFTCHN12000	
1105	0352	6434	JMP HEADER	
1106	0353	0643	SPECIAL, LDF 3	/ALL PARAMETERS HAVE
1107	0354	1020	LDA I	/BEEN TAKEN CARE OF.
1110	0355	6042	6042	/NOW TAKE CARE OF HEADER INFO.
1111	0356	6403	JMP DECBIN	/SET UP STARTING GROUP NO.
1112	0357	1120	ADA I	
1113	0360	7716	-1	
1114	0361	0642	LDF 2	
1115	0362	1040	STA	
1116	0363	3727	GROUP12000	
1117	0364	0024	SFA	/SPECIAL FUNCTION REGISTER.
1120	0365	1620	BSE I	
1121	0366	0020	20	
1122	0367	0004	ESF	
1123	0370	1560	BCL I	
1124	0371	0020	20	
1125	0372	1620	BSE I	
1126	0373	0100	100	
1127	0374	0004	ESF	
1130	0375	0002	PDP	
1131			Pmode	
1132	2376	4502	CLOCK	/SET UP CLOCK.
1133	2377	4503	API	/SET UP AUTOMATIC PRIORITY INTERRU
			PT.	
1134	2400	6141	LINC	
1135			Lmode	
1136	0401	0602	LIF 2	
1137	0402	0022	JMP BEGIN	
1140	0403	4006	DECBIN, STC 6	/DECIMAL TO BINARY CONVER-
1141	0404	1000	LDA	/SION ROUTINE.
1142	0405	0000	0	/ROUTINE IS ENTERED
1143	0406	4433	STC RETURN	/WITH HALF WORD ADDRESS
1144	0407	4424	STC TEMP1	/OF DECIMAL NUMBER
1145	0410	0065	SET I 5	/IN AC.
1146	0411	7774	-3	/EXITS WITH BINARY
1147	0412	1326	NXTDGT, LDH I 6	/NUMBER IN AC.
1150	0413	1560	BCL I	
1151	0414	7760	7760	
1152	0415	2424	ADD TEMP1	
1153	0416	1060	STA I	
1154	0417	0000	TEMP, 0000	
1155	0420	0242	KOL 2	
1156	0421	2417	ADD TEMP	
1157	0422	0241	KOL 1	
1160	0423	1060	STA I	
1161	0424	0000	TEMP1, 0000	
1162	0425	0225	XSK I 5	
1163	0426	6412	JMP NXTDGT	

1164	0427	1326	LDM I 6	
1165	0430	1560	BCL I	
1166	0431	7760	7760	
1167	0432	2424	ADD TEMP1	
1170	0433	0000	RETURN, 0000	/END OF DECBIN.
1171	0434	1020	HEADER, LDA I	/HEADER ROUTINE DOES
1172	0435	0644	LDF 4	/AN ASCII TO EBCDIC
1173	0436	4473	STC FILO	/CONVERSION AND STORES
1174	0437	0065	SET I 5	/IN TAPE BUFFER AREA.
1175	0440	3777	3777	
1176	0441	0011	CLR	
1177	0442	1120	ADA I	
1200	0443	0020	20	
1201	0444	0644	LDF 4	
1202	0445	1065	STA I 5	
1203	0446	0011	CLR	
1204	0447	1065	STA I 5	
1205	0450	1065	STA I 5	/LEAVES ROOM FOR
1206	0451	1120	ADA I	
1207	0452	0001	1	
1210	0453	1065	STA I 5	/BLOCK COUNT.
1211	0454	0064	SET I 4	
1212	0455	0000	0000	
1213	0456	0063	SET I 3	
1214	0457	7775	-2	
1215	0460	6464	JMP LOOP	
1216	0461	1020	CHFLD, LDA I	
1217	0462	0645	LDF 5	
1220	0463	4473	STC FILO	
1221	0464	0643	LOOP, LDF 3	
1222	0465	1324	LDM I 4	
1223	0466	1120	ADA I	
1224	0467	0502	TABLE	
1225	0470	4472	STC NDEX	
1226	0471	1000	LDA	
1227	0472	0704	NDEX, XXXX	
1230	0473	0644	FILO, LDF 4	
1231	0474	1065	STA I 5	
1232	0475	0205	XSK 5	
1233	0476	6464	JMP LOOP	
1234	0477	0223	XSK I 3	
1235	0500	6461	JMP CHFLD	
1236	0501	6353	JMP SPECIAL	/EXITS HERE.
1237	0502	0000	TABLE, 000	/UNDERLINE TO ZEROS.
1240	0503	0301	301	/A
1241	0504	0302	302	/B
1242	0505	0303	303	/C
1243	0506	0304	304	/D
1244	0507	0305	305	/E
1245	0510	0306	306	/F
1246	0511	0307	307	/G
1247	0512	0310	310	/H
1250	0513	0311	311	/I
1251	0514	0321	321	/J
1252	0515	0322	322	/K
1253	0516	0323	323	/L
1254	0517	0324	324	/M
1255	0520	0325	325	/N
1256	0521	0326	326	/O
1257	0522	0327	327	/P
1260	0523	0330	330	/Q
1261	0524	0331	331	/R
1262	0525	0342	342	/S

1263	0526	0343	343	/T
1264	0527	0344	344	/U
1265	0530	0345	345	/V
1266	0531	0346	346	/W
1267	0532	0347	347	/X
1270	0533	0350	350	/Y
1271	0534	0351	351	/Z
1272	0535	0100	100	/33
1273	0536	0012	12	/34
1274	0537	0100	100	/35
1275	0540	0100	100	/36
1276	0541	0100	100	/37
1277	0542	0100	100	/40, SPACE
1300	0543	0132	132	/1
1301	0544	0177	177	/"
1302	0545	0173	173	/43 NOT POSSIBLE 43 IS CR.
1303	0546	0133	133	/S
1304	0547	0154	154	/X
1305	0550	0120	120	/8
1306	0551	0175	175	/
1307	0552	0115	115	/C
1310	0553	0135	135	/)
1311	0554	0134	134	/*
1312	0555	0116	116	/+
1313	0556	0153	153	/,
1314	0557	0140	140	/=
1315	0560	0113	113	/.
1316	0561	0141	141	//
1317	0562	0360	360	/0
1320	0563	0361	361	/1
1321	0564	0362	362	/2
1322	0565	0363	363	/3
1323	0566	0364	364	/4
1324	0567	0365	365	/5
1325	0570	0366	366	/6
1326	0571	0367	367	/7
1327	0572	0370	370	/8
1330	0573	0371	371	/9
1331	0574	0172	172	/!
1332	0575	0136	136	/!
1333	0576	0012	12	/74
1334	0577	0176	176	/"
1335	0600	0100	100	/
1336	0601	0157	157	/?
1337			SEGMENT 2	
1340			*20	
1341	0020	0601	LIF 1	
1342	0021	0020	JMP DISPLA	
1343	0022	0643	BEGIN, LDF 3	
1344	0023	1000	LDA	
1345	0024	1665	TYPET	/CHECK STATUS OF TAPE.
1346	0025	0470	AZE I	
1347	0026	0072	JMP BAKSP	/THIS IS A NEW FILE ONLY.
1350	0027	1460	SAE I	
1351	0030	7425	7425	/IS IT A NEW OR USED TAPE?
1352	0031	0062	JMP NEWTAP	
1353	0032	0011	CLEAR, CLR	
1354	0033	5711	STC FLAG	
1355	0034	0002	SEARCH, PDP	/SEARCH TO EOT IF
1356			PMODE	/IT IS A USED TAPE.
1357	4035	7200	CLA	
1360	4036	4512	IBM	
1361	4037	0060	SPACEF	

1362	4040	0001	I	
1363	4041	0721	MITR	
1364	4042	5241	JMP .-1	
1365	4043	7200	CLA	
1366	4044	1510	TAD I STUS	
1367	4045	0141	LINC	
1370			LMODE	
1371	0046	1560	BCL I	
1372	0047	7677	7677	
1373	0050	1460	SAE I	
1374	0051	0100	Q100	
1375	0052	0032	JMP CLEAR	
1376	0053	1000	LOA	
1377	0054	1711	FLAG	
1400	0055	0450	AZE	
1401	0056	0072	JMP BAKSP	/FOUND EOT,
1402	0057	3712	ADD ONE	
1403	0060	5711	STC FLAG	
1404	0061	6034	JMP SEARCH	
1405	0062	0002	NEWTAP, PDP	/TO HERE IF IT IS A NEW
1406			PMODE	/TAPE.
1407	4063	7200	CLA	
1410	4064	4512	IBM	
1411	4065	0010	REWIND	
1412	4066	7200	CLA	
1413	4067	4512	IBM	
1414	4070	0150	TMIGAP	
1415	4071	0141	LINC	
1416			LMODE	
1417	0072	0002	BAKSP, PUP	/BACK SPACE SO THAT
1420			PMODE	/THE NEXT WRITE WILL
1421	4073	7200	CLA	/WRITE OVER THE TAPE MARK.
1422	4074	4512	IBM	
1423	4075	0070	SPACEB	
1424	4076	0001	I	
1425	4077	7200	CLA	/SPECIFY TO THE TAPE
1426	4100	4512	IBM	/HANDLER THE BUFFER
1427	4101	0030	NBYTE	/SIZE.
1430	4102	0000	RCOSIZ, 0	
1431	4103	2111	ISZ TFLAG	
1432	4104	0141	LINC	
1433			LMODE	
1434	0105	0011	CLR	
1435	0106	1040	STA	
1436	0107	1665	TYPET	
1437	0110	0071	SET I 11	/THESE REGISTERS WILL
1440	0111	1704	MASKE	/BE USED TO COMPARE
1441	0112	0072	SET I 12	/TTY INPUT WITH
1442	0113	1705	SPACE	/DELIMITING CHARACTERS.
1443	0114	0073	SET I 13	
1444	0115	1706	COLON	
1445	0116	0074	SET I 14	
1446	0117	1707	MINUS	
1447	0120	0075	SET I 15	
1450	0121	1710	MASKA	
1451	0122	0011	START, CLR	/THIS CODING SETS UP THE
1452	0123	3735	ADD RCOSKP	/ADDRESS OF THE TWO WORD
1453	0124	1120	ADA I	/BLOCK COUNTER AND
1454	0125	2002	2002	/INITIALIZES IT TO 1.
1455	0126	1040	STA	
1456	0127	0671	MIADR	
1457	0130	3712	ADD ONE	
1460	0131	4664	STC LOADR	

1461	0132	3735	ADD RCDSKP	
1462	0133	3725	ADD K4000	
1463	0134	1040	STA	
1464	0135	1734	ADRES	
1465	0136	4705	STC ADRESS	
1466	0137	5667	STC HIBLOK	
1467	0140	3712	ADD ONE	
1470	0141	5666	STC LOBLOK	
1471	0142	0644	LDF 4	/STORE PARAMETERS
1472	0143	0065	SET I 5	/FOR DTUA PROGRAM.
1473	0144	3761	3761	
1474	0145	0064	SET I 4	
1475	0146	7770	-7	
1476	0147	0063	SET I 3	
1477	0150	1732	HIGP	
1500	0151	1023	LOADPM, LDA I 3	
1501	0152	0310	KOR 8	
1502	0153	1551	BCL 11	
1503	0154	1065	STA I 5	
1504	0155	1003	LDA 3	
1505	0156	1065	STA I 5	
1506	0157	0224	XSK I 4	
1507	0160	0151	JMP LOADPM	
1510	0161	0011	CLR	
1511	0162	3715	ADD K10	
1512	0163	0002	PDP	
1513			PMODE	
1514	4164	6201	ODF 0	
1515	4165	4512	IBM	
1516	4166	0040	WRITE	/WRITE HEADER BLOCK.
1517	4167	0000	MURADR, 0	
1520	4170	6141	LINC	
1521			LMODE	
1522	0171	0002	NEWGP, PDP	
1523			PMODE	
1524	4172	7200	CLA	
1525	4173	1111	TAD TFLAG	
1526	4174	7450	SNA	
1527	4175	5373	JMP .-2	
1530	4176	7200	CLA	
1531	4177	1104	TAD RTAPE	
1532	4200	3106	OCA RTAPE	
1533	4201	6141	LINC	
1534			LMODE	
1535	0202	1000	LDA	
1536	0203	1734	ADRES	
1537	0204	4705	STC ADRESS	
1540	0205	3712	ADD ONE	
1541	0206	1140	ADM	
1542	0207	1727	GROUP	
1543	0210	0314	KOR 14	/PLACE GROUP NO. IN AC.
1544	0211	1555	BCL 15	
1545	0212	0244	KOL 4	
1546	0213	3716	ADD K20	/THIS 13TH BIT IS USED FOR ID
1547	0214	5732	STC HIGP	/PURPOSES IN BADATA.
1550	0215	3727	ADD GROUP	
1551	0216	5731	STC LOGP	
1552	0217	0050	SET 10	
1553	0220	1736	IXTEN	
1554	0221	1020	LDA I	
1555	0222	0644	LDF 4	
1556	0223	1040	STA	
1557	0224	0615	FILL	

1560	0225	4546	STC DATFLD	
1561	0226	0063	SET I 3	
1562	0227	7775	=2	
1563	0230	0644	LDF 4	
1564	0231	0233	JMP .+2	
1565	0232	0646	RCDTWO, LDF 6	
1566	0233	0042	SET 2	
1567	0234	1740	MCHAN	/PLACE GROUP NUMBER
1570	0235	0047	SET 7	
1571	0236	1737	1XSEVN	
1572	0237	1000	LDA	/IN FIRST LOCATIONS
1573	0240	1732	HIGP	/OF DATA RECORDS.
1574	0241	1067	STA I 7	
1575	0242	1000	LDA	
1576	0243	1731	LOGP	
1577	0244	1067	STA I 7	
1600	0245	0222	XSK I 2	
1601	0246	0237	JMP .-7	
1602	0247	0223	XSK I 3	
1603	0250	0232	JMP RCDTWO	
1604	0251	0024	ENABLE, SFA	/ENABLE TTY INTERRUPT.
1605	0252	1560	BCL I	/
1606	0253	0040	40	/
1607	0254	0004	ESF	/
1610	0255	0400	WAIT, SXL 0	/WAIT FOR GROUP TO BEGIN.
1611	0256	0255	JMP .-1	/NO.
1612	0257	1020	LDA I	/YES MAYBE.
1613	0260	7612	-165	
1614	0261	3712	ADD ONE	/DELAY LOOP.
1615	0262	0450	AZE	
1616	0263	0261	JMP .-2	
1617	0264	0400	SXL 0	/TEST AGAIN
1620	0265	0255	JMP WAIT	/FAILED TEST
1621	0266	0024	SFA	/YES LEGIT GROUP
1622	0267	1620	BSE I	/DISABLE TTY
1623	0270	0040	40	/INTERRUPT
1624	0271	0004	ESF	
1625	0272	0015	HTA	/SWITCH ON
1626	0273	1620	BSE I	/RELAY 0.
1627	0274	4040	4040	
1630	0275	0014	ATR	
1631	0276	1020	LDA I	
1632	0277	4323	ADCON	
1633	0300	0640	LUF 0	
1634	0301	1040	STA	
1635	0302	2205	VECCLK12000	
1636	0303	0644	LDF 4	
1637	0304	6306	JMP .+2	
1640	0305	6635	WRITAP, JMP TAPE	
1641	0306	0420	SAMRCU, SXL I 0	/END OF GROUP?
1642	0307	6306	JMP .-1	/NO.
1643	0310	1020	LDA I	/YES.
1644	0311	0236	ADOFF	
1645	0312	0640	LUF 0	
1646	0313	1040	STA	
1647	0314	2205	VECCLK12000	
1650	0315	0015	HTA	/SWITCH OFF
1651	0316	1560	BCL I	/RELAY 0.
1652	0317	4040	4040	
1653	0320	0014	ATR	
1654	0321	6612	JMP WRAPUP	
1655	0322	6171	JMP NEWGP	
1656			PMODE	

1657	4323	6141	ADCON,	LINC	/ACTUAL ATOD CONVERSION
1660				LMODE	/BEGINS HERE.
1661	0324	0110		SAM 10	
1662	0325	0111		SAM 11	
1663	0326	0451		APD	/IF CONVERTED NUMBER IS NEG
1664	0327	3712		ADD ONE	/ADD 1 TO MAKE IT TWOS COMP,
1665	0330	0500		IOB	/THEN SEND IT OUT TO
1666	0331	6551		6551	/THE DTOA CONVERTER.
1667	0332	5742		STC CH0	/THEN STORE IT.
1670	0333	0112		SAM 12	
1671	0334	0451		APD	
1672	0335	3712		ADD ONE	
1673	0336	0500		IOB	
1674	0337	6552		6552	
1675	0340	5743		STC CH1	
1676	0341	0016	TWOCHN,	NOP	/IF TWO CHANNEL THIS
1677	0342	0113		SAM 13	/NOP WILL BE REPLACED
1700	0343	0451		APD	/WITH A JMP JSW1.
1701	0344	3712		ADD ONE	
1702	0345	0500		IOB	
1703	0346	6553		6553	
1704	0347	5744		STC CH2	
1705	0350	0016	THRCHN,	NOP	
1706	0351	0114		SAM 14	
1707	0352	0451		APD	
1710	0353	3712		ADD ONE	
1711	0354	0500		IOB	
1712	0355	6554		6554	
1713	0356	5745		STC CH3	
1714	0357	0016	FORCHN,	NOP	
1715	0360	0115		SAM 15	
1716	0361	0451		APD	
1717	0362	3712		ADD ONE	
1720	0363	0500		IOB	
1721	0364	6555		6555	
1722	0365	5746		STC CH4	
1723	0366	0016	FIVCHN,	NOP	
1724	0367	0116		SAM 16	
1725	0370	0451		APD	
1726	0371	3712		ADD ONE	
1727	0372	0500		IOB	
1730	0373	6556		6556	
1731	0374	5747		STC CH5	
1732	0375	0016	SIXCHN,	NOP	
1733	0376	0117		SAM 17	
1734	0377	0451		APD	
1735	0400	3712		ADD ONE	
1736	0401	0500		IOB	
1737	0402	6561		6561	
1740	0403	5750		STC CH6	
1741	0404	0016	SEVCHN,	NOP	
1742	0405	0120		SAM 20	
1743	0406	0451		APD	
1744	0407	3712		ADD ONE	
1745	0410	0500		IOB	
1746	0411	6562		6562	
1747	0412	5751		STC CH7	
1750	0413	0016	EMTCHN,	NOP	
1751	0414	0121		SAM 21	
1752	0415	0451		APD	
1753	0416	3712		ADD ONE	
1754	0417	0500		IOB	
1755	0420	6563		6563	

1756	0421	5752	STC CH8
1757	0422	0016	NINCHN, NOP
1760	0423	0122	SAM 22
1761	0424	0451	APD
1762	0425	5712	ADD ONE
1763	0426	0500	IOB
1764	0427	6564	6564
1765	0430	5753	STC CH9
1766	0431	0016	TENCHN, NOP
1767	0432	0123	SAM 23
1770	0433	0451	APD
1771	0434	5712	ADD ONE
1772	0435	0500	IOB
1773	0436	6565	6565
1774	0437	5754	STC CH10
1775	0440	0016	ELVCHN, NOP
1776	0441	0124	SAM 24
1777	0442	0451	APD
2000	0443	5712	ADD ONE
2001	0444	0500	IOB
2002	0445	6566	6566
2003	0446	5755	STC CH11
2004	0447	0016	TWLCHN, NOP
2005	0450	0125	SAM 25
2006	0451	0451	APD
2007	0452	5712	ADD ONE
2010	0453	5756	STC CH12
2011	0454	0016	TRTCHN, NOP
2012	0455	0126	SAM 26
2013	0456	0451	APD
2014	0457	5712	ADD ONE
2015	0460	5757	STC CH13
2016	0461	0016	FRTCHN, NOP
2017	0462	0127	SAM 27
2020	0463	0451	APD
2021	0464	5712	ADD ONE
2022	0465	5760	STC CH14
2023	0466	0016	FFTCHN, NOP
2024	0467	0130	SAM 30
2025	0470	0451	APD
2026	0471	5712	ADD ONE
2027	0472	5761	STC CH15
2030	0473	6542	JSW1, JMP UNPAK
2031	0474	0011	CLR
2032	0475	0400	SXL 0
2033	0476	6500	JMP .+2
2034	0477	3725	ADD K4000
2035	0500	0401	SXL 1
2036	0501	6503	JMP .+2
2037	0502	3724	ADD K2000
2040	0503	0402	SXL 2
2041	0504	6506	JMP .+2
2042	0505	3723	ADD K1000
2043	0506	0403	SXL 3
2044	0507	6511	JMP .+2
2045	0510	3722	ADD K400
2046	0511	0404	SXL 4
2047	0512	6514	JMP .+2
2050	0513	3721	ADD K200
2051	0514	0405	SXL 5
2052	0515	6517	JMP .+2
2053	0516	3720	ADD K100
2054	0517	0406	SXL 6

/IF CH0 IS AN EDIT
 /CHANNEL, JSW1 WILL BE
 /REPLACED WITH A NOP
 /AND THIS CODING WILL
 /BE EXECUTED.
 /IT BUILDS THE EDIT WORD.

2055	0520	6522	JMP .+2	
2056	0521	3717	ADD K40	
2057	0522	0407	SXL 7	
2060	0523	6525	JMP .+2	
2061	0524	3716	ADD K20	
2062	0525	0410	SXL 10	
2063	0526	6530	JMP .+2	
2064	0527	3715	ADD K10	
2065	0530	0411	SXL 11	
2066	0531	6533	JMP .+2	
2067	0532	3714	ADD K4	
2070	0533	0412	SXL 12	
2071	0534	6536	JMP .+2	
2072	0535	3713	ADD K2	
2073	0536	0413	SXL 13	
2074	0537	6541	JMP .+2	
2075	0540	3712	ADD ONE	
2076	0541	5742	STC CH0	
2077	0542	0042	UNPAK, SET 2	/THIS IS THE PORTION THAT
2100	0543	1740	MCHAN	/UNPACKS THE CONVERTED
2101	0544	0063	SET I 3	/NUMBERS AND STORES THEM
2102	0545	1741	CHAN	/IN TWO WORDS IN THE
2103	0546	0644	DATFLD, LDF 4	/TAPE BUFFER.
2104	0547	1023	LDA I 3	
2105	0550	1555	BCL 15	
2106	0551	0350	SCR 8	
2107	0552	1070	STA I 10	
2110	0553	1003	LDA 3	
2111	0554	1070	STA I 10	
2112	0555	0210	XSK 10	/END OF LINC FIELD?
2113	0556	6575	JMP FRAME	/NO
2114	0557	0011	CLR	/YES .
2115	0560	2546	ADD DATFLD	
2116	0561	3712	ADD ONE	
2117	0562	1560	BCL I	
2120	0563	0014	14	
2121	0564	3714	ADD K4	
2122	0565	1040	STA	
2123	0566	0546	DATFLD	
2124	0567	1040	STA	
2125	0570	0015	FILL	
2126	0571	1560	BCL I	
2127	0572	7776	7776	
2130	0573	0470	AZE I	/END OF RECORD?
2131	0574	6600	JMP NEWRCO	/YES
2132	0575	0222	FRAME, XSK I 2	/NO, END OF FRAME?
2133	0576	6546	JMP DATFLD	/NO
2134	0577	6607	JMP SAMXIT	/YES
2135	0600	0050	NEWRCO, SET 10	
2136	0601	1736	IXTEN	
2137	0602	0002	PDP	
2140			Pmode	
2141	4603	6201	COF 0	
2142	4604	1106	TAD RTAPE	
2143	4605	3507	UCA I INT	
2144	4606	6141	LINC	
2145			Lmode	
2146	0607	0002	SAMXIT, PDP	
2147			Pmode	
2150	4610	6135	CLSA	
2151	4611	6771	WEST	
2152			Lmode	
2153	0612	1000	WRAPUP, LDA	/FILL BUFFER WITH 409.

2154	0613	0000	0	
2155	0614	4704	STC EXIT	
2156	0615	0644	FILL, LDF 4	
2157	0616	1020	LDA 1	
2160	0617	0040	0040	
2161	0620	1070	STA I 10	
2162	0621	0210	XSK 10	
2163	0622	6620	JMP .-2	
2164	0623	1000	LDA	
2165	0624	0615	FILL	
2166	0625	1560	BCL I	
2167	0626	7776	7776	
2170	0627	0450	AZE	
2171	0630	6640	JMP WRIT	
2172	0631	3712	ADD ONE	
2173	0632	2615	ADD FILL	
2174	0633	4615	STC FILL	
2175	0634	6615	JMP FILL	
2176	0635	1000	TAPE, LDA	
2177	0636	0000	0	
2200	0637	4704	STC EXIT	
2201	0640	1000	WRIT, LDA	
2202	0641	1725	K4000	
2203	0642	2705	ADD ADDRESS	
2204	0643	1560	BCL I	
2205	0644	0001	1	
2206	0645	1040	STA	
2207	0646	0705	ADDRESS	
2210	0647	0242	NOL 2	
2211	0650	1560	BCL I	
2212	0651	7775	7775	
2213	0652	1120	ADA I	
2214	0653	0644	644	
2215	0654	4662	STC LNKFLD	
2216	0655	0011	CLR	
2217	0656	3712	ADD ONE	
2220	0657	3666	ADD LOBLOK	
2221	0660	0264	NOL I 4	
2222	0661	0250	NOL 8	
2223	0662	0000	LNKFLD, 0000	
2224	0663	1040	STA	
2225	0664	0000	LOADR, 0	/POINTER TO LOW
2226	0665	5666	STC LOBLOK	/ORDER BYTE OF
2227	0666	1200	LAM	/BLOCK COUNT.
2230	0667	1667	HIBLOK	
2231	0670	1040	STA	
2232	0671	0000	HIAOR, 0	/POINTER TO HIGH
2233	0672	0002	PDP	/ORDER BYTE.
2234			Pmode	
2235	4673	7300	CLA CLL	
2236	4674	1305	TAD ADDRESS	
2237	4675	3302	UCA ADR	
2240	4676	1101	TAD K0010	
2241	4677	6201	CDF 0	
2242	4700	4512	IBM	
2243	4701	0040	WRITE	
2244	4702	0000	ADR, 0	
2245	4703	6141	LINC	
2246			Lmode	
2247	0704	0000	EXIT, 0	
2250	0705	0000	ADDRESS, 0	
2251			Pmode	
2252	4706	7200	KBRD, CLA	/INTERRUPT TO HERE

2253	4707	6034	KRS	
2254	4710	6141	LINC	/IF SOMETHING WAS TYPED.
2255			LMODE	
2256	0711	1460	SAE I	/WAS IT AN F FOR
2257	0712	0206	206	/END OF FILE?
2260	0713	6742	JMP EOT	/NO.
2261	0714	1020	LDA I	/YES, WRITE END OF FILE
2262	0715	0212	212	
2263	0716	0002	PDP	
2264			PMODE	
2265	4717	6046	TLS	
2266	4720	6201	COF 0	
2267	4721	7200	CLA	
2270	4722	4512	IBM	
2271	4723	0150	TMIGAP	
2272	4724	6721	MTTR	
2273	4725	5324	JMP .-1	
2274	4726	2111	ISZ TFLAG	
2275	4727	7200	CLA	
2276	4730	4512	IBM	
2277	4731	0150	TMIGAP	
2300	4732	6721	MTTR	
2301	4733	5332	JMP .-1	
2302	4734	2111	ISZ TFLAG	
2303	4735	6032	KCC	
2304	4736	6002	LOF	
2305	4737	6141	LINC	
2306			LMODE	
2307	0740	0601	LIF 1	
2310	0741	6037	JMP RESTR	
2311	0742	1460	SAE I	/WAS IT A T FOR
2312	0743	0224	224	/END OF TAPE?
2313	0744	7002	JMP TIME	/NO.
2314	0745	0002	PDP	/YES, WRITE END OF
2315			PMODE	/TAPE AND RETURN TO DIAL.
2316	4746	6201	COF 0	
2317	4747	7200	CLA	
2320	4750	4512	IBM	
2321	4751	0150	TMIGAP	
2322	4752	6721	MTTR	
2323	4753	5352	JMP .-1	
2324	4754	2111	ISZ TFLAG	
2325	4755	7200	CLA	
2326	4756	4512	IBM	
2327	4757	0150	TMIGAP	
2330	4760	6721	MTTR	
2331	4761	5360	JMP .-1	
2332	4762	2111	ISZ TFLAG	
2333	4763	7200	CLA	
2334	4764	4512	IBM	
2335	4765	0010	REWIND	
2336	4766	6721	MTTR	
2337	4767	5366	JMP .-1	
2340	4770	2111	ISZ TFLAG	
2341	4771	6032	KCC	
2342	4772	6002	LOF	
2343	4773	6141	LINC	
2344			LMODE	
2345	0774	0643	LOF 3	
2346	0775	0076	SET I 16	
2347	0776	0701	0701	
2350	0777	0077	SET I 17	
2351	1000	7300	7300	

EOT,

2352	1001	6016	JMP 16	
2353	1002	1460	SAE I	/WAS IT A LINEFEED?
2354	1003	0212	212	
2355	1004	7052	SW1, JMP EXIT2	/NO.
2356	1005	0077	SET I 17	
2357	1006	1777	1777	
2360	1007	1020	LDA I	
2361	1010	7014	JMP RUBOUT	
2362	1011	5004	STC SW1	
2363	1012	5003	ADD TIME+1	
2364	1013	7036	JMP STORE	
2365	1014	1455	RUBOUT, SAE 15	/WAS IT A RUBOUT?
2366	1015	7025	JMP RET	/NO.
2367	1016	0217	XSK 17	/YES.
2370	1017	7021	JMP .+2	
2371	1020	7052	JMP EXIT2	
2372	1021	0237	XSK I 17	
2373	1022	1020	LDA I	
2374	1023	0334	334	/\
2375	1024	7050	JMP PRNT	
2376	1025	1460	RET, SAE I	/WAS IT A RETURN?
2377	1026	0215	215	
2400	1027	7036	JMP STORE	/NO.
2401	1030	0500	10B	
2402	1031	6046	6046	/TLS
2403	1032	1020	LDA I	/YES
2404	1033	7052	JMP EXIT2	
2405	1034	5004	STC SW1	
2406	1035	7057	JMP CLEER	
2407	1036	1057	STORE, STA 17	
2410	1037	5702	STC TEMP2	
2411	1040	1000	LDA	
2412	1041	0017	17	
2413	1042	1460	SAE I	/SAFETY CHECK TO PREVENT
2414	1043	1742	CH0	/WRITING OVER THE PROGRAM.
2415	1044	3703	ADD NEGTV	
2416	1045	4017	STC 17	
2417	1046	1000	LDA	
2420	1047	1702	TEMP2	
2421	1050	0500	PHNT, 10B	
2422	1051	6046	6046	/TLS
2423	1052	0002	EXIT2, PDP	
2424			Pmode	
2425	5053	6032	KCC	
2426	5054	6771	REST	
2427	5055	6042	TTY, TCF	
2430	5056	6771	REST	
2431			Lmode	
2432	1057	0011	CLEER, CLR	
2433	1060	3722	ADD K400	
2434	1061	5670	STC CODE1	
2435	1062	3723	ADD K1000	
2436	1063	5671	STC CODE2	
2437	1064	1020	LDA I	
2440	1065	1400	1400	
2441	1066	5672	STC CODE3	
2442	1067	3724	ADD K2000	
2443	1070	5673	STC CODE4	
2444	1071	1020	LDA I	
2445	1072	3400	3400	
2446	1073	5674	STC CODE7	
2447	1074	3725	ADD K4000	
2450	1075	5675	STC CODE8	

2451	1076	1020	LDA I	
2452	1077	4400	4400	
2453	1100	5676	STC CODE9	
2454	1101	1020	LDA I	
2455	1102	5000	5000	
2456	1103	5677	STC CODE10	
2457	1104	1020	LDA I	
2460	1105	7000	7000	
2461	1106	5700	STC CODE13	
2462	1107	1020	LDA I	
2463	1110	6400	6400	
2464	1111	5701	STC CODE14	
2465	1112	1037	TSTCHR, LDA I 17	
2466	1113	1452	SAE 12	/IS IT A SPACE?
2467	1114	7116	JMP .+2	/NO
2470	1115	7412	JMP CODE	/YES
2471	1116	1454	SAE 14	/IS IT A DASH
2472	1117	7121	JMP BSEC	/NO
2473	1120	7255	JMP ASEC	/YES
2474	1121	1453	BSEC, SAE 13	/IS IT A COLON?
2475	1122	7124	JMP .+2	/NO
2476	1123	7146	JMP BMIN	/YES
2477	1124	1551	BCL 11	
2500	1125	1140	ADM	
2501	1126	1677	CODE10	
2502	1127	1037	LDA I 17	
2503	1130	1454	SAE 14	/IS IT A DASH?
2504	1131	7133	JMP .+2	/NO
2505	1132	7255	JMP ASEC	/YES
2506	1133	1453	SAE 13	/COLON?
2507	1134	7136	JMP .+2	/NO
2510	1135	7146	JMP BMIN	/YES
2511	1136	1551	BCL 11	
2512	1137	0244	NOL 4	
2513	1140	1140	ADM	
2514	1141	1677	CODE10	
2515	1142	1037	LDA I 17	
2516	1143	1454	SAE 14	/DASH?
2517	1144	7146	JMP .+2	/NO, ASSUME IT IS A COLON.
2520	1145	7255	JMP ASEC	/YES
2521	1146	1037	BMIN, LDA I 17	
2522	1147	1453	SAE 13	/COLON?
2523	1150	7152	JMP .+2	/NO
2524	1151	7174	JMP BHOURS	
2525	1152	1551	BCL 11	
2526	1153	1140	ADM	
2527	1154	1676	CODE9	
2530	1155	1037	LDA I 17	
2531	1156	1454	SAE 14	/DASH?
2532	1157	7161	JMP .+2	/NO
2533	1160	7255	JMP ASEC	/YES
2534	1161	1453	SAE 13	/COLON?
2535	1162	7164	JMP .+2	/NO
2536	1163	7174	JMP BHOURS	/YES
2537	1164	1551	BCL 11	
2540	1165	0244	NOL 4	
2541	1166	1140	ADM	
2542	1167	1676	CODE9	
2543	1170	1037	LDA I 17	
2544	1171	1454	SAE 14	/DASH?
2545	1172	7174	JMP .+2	/NO, ASSUME IT IS A COLON
2546	1173	7255	JMP ASEC	/YES
2547	1174	1037	BHOURS, LDA I 17	

2550	1175	1453	SAE 13	/COLON?
2551	1176	7200	JMP .+2	/NO
2552	1177	7222	JMP 8DAYS	/YES
2553	1200	1551	BCL 11	
2554	1201	1140	ADM	
2555	1202	1675	CODE8	
2556	1203	1037	LDA I 17	
2557	1204	1454	SAE 14	/DASH?
2560	1205	7207	JMP .+2	/NO
2561	1206	7255	JMP ASEC	/YES
2562	1207	1453	SAE 13	/COLON?
2563	1210	7212	JMP .+2	/NO
2564	1211	7222	JMP 8DAYS	/YES
2565	1212	1551	BCL 11	
2566	1213	0244	NOL 4	
2567	1214	1140	ADM	
2570	1215	1675	CODE8	
2571	1216	1037	LDA I 17	
2572	1217	1454	SAE 14	/DASH?
2573	1220	7222	JMP .+2	/NO, ASSUME IT IS A COLON.
2574	1221	7255	JMP ASEC	/YES
2575	1222	1037	LDA I 17	
2576	1223	1454	SAE 14	/DASH
2577	1224	7226	JMP .+2	/NO
2600	1225	7255	JMP ASEC	/YES
2601	1226	1551	BCL 11	
2602	1227	1140	ADM	
2603	1230	1674	CODE7	
2604	1231	1037	LDA I 17	
2605	1232	1454	SAE 14	/DASH
2606	1233	7235	JMP .+2	
2607	1234	7255	JMP ASEC	
2610	1235	1551	BCL 11	
2611	1236	0244	NOL 4	
2612	1237	1140	ADM	
2613	1240	1674	CODE7	
2614	1241	1037	LDA I 17	
2615	1242	1454	SAE 14	/DASH?
2616	1243	7245	JMP .+2	
2617	1244	7255	JMP ASEC	
2620	1245	1551	BCL 11	
2621	1246	0246	NOL 6	
2622	1247	1140	ADM	
2623	1250	1675	CODE8	
2624	1251	1037	LDA I 17	
2625	1252	1452	SAE 12	/SPACE?
2626	1253	7255	JMP .+2	/NO ASSUME IT IS A DASH.
2627	1254	7412	JMP CODE	/YES
2630	1255	1037	LDA I 17	
2631	1256	1452	SAE 12	/SPACE?
2632	1257	7261	JMP .+2	
2633	1260	7412	JMP CODE	
2634	1261	1453	SAE 13	/COLON?
2635	1262	7264	JMP .+2	
2636	1263	7306	JMP AMIN	
2637	1264	1551	BCL 11	
2640	1265	1140	ADM	
2641	1266	1673	CODE4	
2642	1267	1037	LDA I 17	
2643	1270	1452	SAE 12	/SPACE?
2644	1271	7273	JMP .+2	/NO
2645	1272	7412	JMP CODE	/YES
2646	1273	1453	SAE 13	/COLON

2647	1274	7276	JMP .+2	
2650	1275	7306	JMP AMIN	
2651	1276	1551	BCL 11	
2652	1277	0244	MOL 4	
2653	1300	1140	ADM	
2654	1301	1673	CODE4	
2655	1302	1037	LDA I 17	
2656	1303	1452	SAE 12	/SPACE?
2657	1304	7306	JMP .+2	/NO, ASSUME IT IS A COLON
2660	1305	7412	JMP CODE	
2661	1306	1037	LDA I 17	
2662	1307	1453	SAE 13	/COLON?
2663	1310	7312	JMP .+2	
2664	1311	7334	JMP AMOUR	
2665	1312	1551	BCL 11	
2666	1313	1140	ADM	
2667	1314	1672	CODE3	
2670	1315	1037	LDA I 17	
2671	1316	1452	SAE 12	/SPACE?
2672	1317	7321	JMP .+2	
2673	1320	7412	JMP CODE	
2674	1321	1453	SAE 13	/COLON?
2675	1322	7324	JMP .+2	
2676	1323	7334	JMP AMOUR	
2677	1324	1551	BCL 11	
2700	1325	0244	MOL 4	
2701	1326	1140	ADM	
2702	1327	1672	CODE3	
2703	1330	1037	LDA I 17	
2704	1331	1452	SAE 12	/SPACE?
2705	1332	7334	JMP .+2	/NO ASSUME IT IS A COLON.
2706	1333	7412	JMP CODE	
2707	1334	1037	LDA I 17	
2710	1335	1453	SAE 13	/COLON?
2711	1336	7340	JMP .+2	
2712	1337	7362	JMP ADAY	
2713	1340	1551	BCL 11	
2714	1341	1140	ADM	
2715	1342	1671	CODE2	
2716	1343	1037	LDA I 17	
2717	1344	1452	SAE 12	/SPACE?
2720	1345	7347	JMP .+2	
2721	1346	7412	JMP CODE	
2722	1347	1453	SAE 13	/COLON
2723	1350	7352	JMP .+2	
2724	1351	7362	JMP ADAY	
2725	1352	1551	BCL 11	
2726	1353	0244	MOL 4	
2727	1354	1140	ADM	
2730	1355	1671	CODE2	
2731	1356	1037	LDA I 17	
2732	1357	1452	SAE 12	/SPACE
2733	1360	7362	JMP .+2	/NO, ASSUME IT IS A COLON.
2734	1361	7412	JMP CODE	
2735	1362	1037	LDA I 17	
2736	1363	1452	SAE 12	/SPACE
2737	1364	7366	JMP .+2	
2740	1365	7412	JMP CODE	
2741	1366	1551	BCL 11	
2742	1367	1140	ADM	
2743	1370	1670	CODE1	
2744	1371	1037	LDA I 17	
2745	1372	1452	SAE 12	/SPACE

2746	1373	7375	JMP .+2	
2747	1374	7412	JMP CODE	
2750	1375	1551	BCL 11	
2751	1376	0244	MOL 4	
2752	1377	1140	ADM	
2753	1400	1670	CODE1	
2754	1401	1037	LDA I 17	
2755	1402	1452	SAE 12	/SPACE
2756	1403	7405	JMP .+2	
2757	1404	7412	JMP CODE	
2760	1405	1551	BCL 11	
2761	1406	0246	MOL 6	
2762	1407	1140	ADM	
2763	1410	1671	CODE2	
2764	1411	1037	LDA I 17	/ASSUME A SPACE HERE.
2765	1412	1037	LDA I 17	
2766	1413	1137	ADA I 17	
2767	1414	1460	SAE I	
2770	1415	0646	646	/SEARCH TO START
2771	1416	7430	JMP SP	
2772	1417	1000	LDA	
2773	1420	1700	CODE13	
2774	1421	3713	ADD K2	
2775	1422	5700	STC CODE13	
2776	1423	3701	ADD CODE14	
2777	1424	3712	ADD ONE	
3000	1425	5701	STC CODE14	
3001	1426	7567	JMP STROBE	
3002	1427	7052	JMP EXIT2	
3003	1430	1460	SP, SAE I	
3004	1431	0643	643	/STOP
3005	1432	7441	JMP FD	
3006	1433	1000	LDA	
3007	1434	1701	CODE14	
3010	1435	3713	ADD K2	
3011	1436	5701	STC CODE14	
3012	1437	7567	JMP STROBE	
3013	1440	7052	JMP EXIT2	
3014	1441	1460	FD, SAE I	
3015	1442	0612	612	/FORWARD
3016	1443	7455	JMP RV	
3017	1444	1000	LDA	
3020	1445	1700	CODE13	
3021	1446	3712	ADD ONE	
3022	1447	5700	STC CODE13	
3023	1450	3701	ADD CODE14	
3024	1451	3714	ADD K4	
3025	1452	5701	STC CODE14	
3026	1453	7567	JMP STROBE	
3027	1454	7052	JMP EXIT2	
3030	1455	1460	RV, SAE I	
3031	1456	0650	650	/REVERSE
3032	1457	7471	JMP FF	
3033	1460	1000	LDA	
3034	1461	1700	CODE13	
3035	1462	3712	ADD ONE	
3036	1463	5700	STC CODE13	
3037	1464	3701	ADD CODE14	
3040	1465	3715	ADD K10	
3041	1466	5701	STC CODE14	
3042	1467	7567	JMP STROBE	
3043	1470	7052	JMP EXIT2	
3044	1471	1460	FF, SAE I	

3045	1472	0614	614	/FAST FORWARD
3046	1473	7506	JMP FR	
3047	1474	1000	LDA	
3050	1475	1700	CODE13	
3051	1476	3712	ADD ONE	
3052	1477	5700	STC CODE13	
3053	1500	1020	LDA I	
3054	1501	0024	24	
3055	1502	1140	ADM	
3056	1503	1701	CODE14	
3057	1504	7567	JMP STROBE	
3060	1505	7052	JMP EXIT2	
3061	1506	1460	SAE I	
3062	1507	0630	630	/FAST REVERSE
3063	1510	7523	JMP RC	
3064	1511	1000	LDA	
3065	1512	1700	CODE13	
3066	1513	3712	ADD ONE	
3067	1514	5700	STC CODE13	
3070	1515	1020	LDA I	
3071	1516	0030	30	
3072	1517	1140	ADM	
3073	1520	1701	CODE14	
3074	1521	7567	JMP STROBE	
3075	1522	7052	JMP EXIT2	
3076	1523	1460	SAE I	
3077	1524	0625	625	/RECYCLE
3100	1525	7537	JMP SC	
3101	1526	1000	LDA	
3102	1527	1700	CODE13	
3103	1530	3715	ADD K10	
3104	1531	5700	STC CODE13	
3105	1532	3701	ADD CODE14	
3106	1533	3712	ADD ONE	
3107	1534	5701	STC CODE14	
3110	1535	7567	JMP STROBE	
3111	1536	7611	JMP INTRVL	
3112	1537	1460	SAE I	
3113	1540	0626	626	/SINGLE CYCLE
3114	1541	7553	JMP CN	
3115	1542	1000	LDA	
3116	1543	1700	CODE13	
3117	1544	3714	ADD K4	
3120	1545	5700	STC CODE13	
3121	1546	3701	ADD CODE14	
3122	1547	3712	ADD ONE	
3123	1550	5701	STC CODE14	
3124	1551	7567	JMP STROBE	
3125	1552	7611	JMP INTRVL	
3126	1553	1460	SAE I	
3127	1554	0621	621	/CONTINUOUS
3130	1555	7052	JMP EXIT2	
3131	1556	1000	LDA	
3132	1557	1700	CODE13	
3133	1560	3712	ADD ONE	
3134	1561	5700	STC CODE13	
3135	1562	3701	ADD CODE14	
3136	1563	3714	ADD K4	
3137	1564	5701	STC CODE14	
3140	1565	7567	JMP STROBE	
3141	1566	7611	JMP INTRVL	
3142	1567	1000	STROBE, LDA	
3143	1570	0000	0	

3144	1571	5610	STC EXIT4	
3145	1572	0005	SET I 5	
3146	1573	1667	CODE1-1	
3147	1574	0006	SET I 6	
3150	1575	7765	-12	
3151	1576	1025	LOAD, LOA I 5	
3152	1577	0500	IOB	
3153	1600	6306	6306	/LOAD OUTPUT REGISTER
3154	1601	0500	IOB	
3155	1602	6304	6304	/STROBE
3156	1603	0500	IOB	
3157	1604	6301	6301	/SKIP ON READY
3160	1605	7603	JMP .-2	
3161	1606	0226	XSK I 6	
3162	1607	7576	JMP LOAD	
3163	1610	0000	EXIT4, 0000	
3164	1611	0024	INTRVL, SFA	
3165	1612	1620	BSE I	
3166	1613	0040	40	
3167	1614	0004	ESF	
3170	1615	0002	PDP	
3171			PMODE	
3172	5616	6002	IOF	
3173	5617	4503	API	
3174	5620	1105	TAD ITAPE	
3175	5621	3106	UCA RTAPE	
3176	5622	0141	LINC	
3177			LMODE	
3200	1623	0460	SNS I 0	
3201	1624	6251	JMP ENABLE	
3202	1625	0500	IOB	
3203	1626	6303	6303	/SKIP ON INTERVAL
3204	1627	7623	JMP .-4	
3205	1630	0015	KTA	
3206	1631	1620	BSE I	
3207	1632	4040	4040	
3210	1633	0014	ATR	
3211	1634	1020	LOA I	
3212	1635	4323	ADCUN	
3213	1636	0640	LDF 0	
3214	1637	1040	STA	
3215	1640	2205	VECCLK12000	
3216	1641	0644	LDF 4	
3217	1642	7644	JMP .+2	
3220	1643	6635	JTAP, JMP TAPE	
3221	1644	0500	IOB	
3222	1645	6303	6303	/SKIP ON INTERVAL
3223	1646	7650	JMP .+2	
3224	1647	7644	JMP .-3	
3225	1650	1020	LOA I	
3226	1651	0236	ADOFF	
3227	1652	0640	LDF 0	
3230	1653	1040	STA	
3231	1654	2205	VECCLK12000	
3232	1655	0015	KTA	
3233	1656	1560	BCL I	
3234	1657	4040	4040	
3235	1660	0014	ATR	
3236	1661	6612	JMP WRAPUP	
3237	1662	0500	IOB	
3240	1663	6032	6032	/KCC
3241	1664	6171	JMP NEWGP	
3242	1665	0000	TYPET, 0	

3243	1666	0000	LOBLOK, 0
3244	1667	0000	HIBLOK, 0
3245	1670	0400	CODE1, 400
3246	1671	1000	CODE2, 1000
3247	1672	1400	CODE3, 1400
3250	1673	2000	CODE4, 2000
3251	1674	3400	CODE7, 3400
3252	1675	4000	CODE8, 4000
3253	1676	4400	CODE9, 4400
3254	1677	5000	CODE10, 5000
3255	1700	7000	CODE13, 7000
3256	1701	6400	CODE14, 6400
3257	1702	0000	TEMP2, 0
3260	1703	7776	NEGTV, -1
3261	1704	7760	MASK6, 7760
3262	1705	0240	SPACE, 240
3263	1706	0272	COLON, 272
3264	1707	0255	MINUS, 255
3265	1710	0377	MASKA, 377
3266	1711	0000	FLAG, 0
3267	1712	0001	ONE, 1
3270	1713	0002	K2, 2
3271	1714	0004	K4, 4
3272	1715	0010	K10, 10
3273	1716	0020	K20, 20
3274	1717	0040	K40, 40
3275	1720	0100	K100, 100
3276	1721	0200	K200, 200
3277	1722	0400	K400, 400
3300	1723	1000	K1000, 1000
3301	1724	2000	K2000, 2000
3302	1725	4000	K4000, 4000
3303	1726	0000	XSAMP, 0
3304	1727	0000	GROUP, 0
3305	1730	0000	RCDFUL, 0
3306	1731	0000	LOGP, 0
3307	1732	0000	HIGP, 0
3310	1733	0000	RUSIZE, 0
3311	1734	0000	ADRES, 0
3312	1735	0000	HCDSKP, 0
3313	1736	0000	IXTEN, 0
3314	1737	0000	IXSEVN, 0
3315	1740	0000	MCHAN, 0
3316	1741	0000	CHAN, 0
3317	1742	0000	CH0, 0
3320	1743	0000	CH1, 0
3321	1744	0000	CH2, 0
3322	1745	0000	CH3, 0
3323	1746	0000	CH4, 0
3324	1747	0000	CH5, 0
3325	1750	0000	CH6, 0
3326	1751	0000	CH7, 0
3327	1752	0000	CH8, 0
3330	1753	0000	CH9, 0
3331	1754	0000	CH10, 0
3332	1755	0000	CH11, 0
3333	1756	0000	CH12, 0
3334	1757	0000	CH13, 0
3335	1760	0000	CH14, 0
3336	1761	0000	CH15, 0
3337			SEGMENT 3
3340			#1
3341	0001	0000	ANS1, 0

3342			*10
3343	0010	0000	0
3344			*36
3345	0036	0000	0
3346			*53
3347	0053	0000	0
3350			*232
3351	0232	4747	4747
3352			*1000
3353	1000	0040	
3353	1001	0116	
3353	1002	0114	
3353	1003	1707	
3353	1004	4024	
3353	1005	1740	
3353	1006	0411	
3353	1007	0711	
3353	1010	2401	
3353			MESS0, TEXT ZF ANALOG TO DIGITAL
3354	1011	1443	
3354	1012	0603	
3354	1013	1716	
3354	1014	2605	
3354	1015	2223	
3354	1016	1117	
3354	1017	1640	
3354	1020	4020	
3354	1021	2217	
3354	1022	0722	
3354	1023	0115	
3354			FCONVERSION PROGRAM
3355	1024	4043	
3355			
3356	1025	4743	
3356			
3357	1026	4043	
3357	1027	4040	
3357	1030	4040	
3357	1031	4040	
3357	1032	4040	
3357	1033	4040	
3357	1034	1305	
3357	1035	1616	
3357	1036	1124	
3357	1037	1040	
3357	1040	2740	
3357	1041	2324	
3357	1042	0526	
3357	1043	0516	
3357			KENNITH W STEVENS
3360	1044	2343	
3360	1045	4040	
3360	1046	4040	
3360	1047	4040	
3360	1050	4040	
3360	1051	4040	
3360	1052	4040	
3360	1053	2523	
3360	1054	0106	
3360	1055	4023	
3360	1056	0115	
3360	1057	4061	
3360	1060	7167	

3360
 3361 1061 6743
 3361
 3362 1062 4740
 3362 1063 4347
 3362
 3363 1064 4043
 3363
 3364 1065 4740
 3364 1066 4340
 3364 1067 4040
 3364 1070 4050
 3364 1071 2431
 3364 1072 2005
 3364 1073 4014
 3364 1074 1116
 3364 1075 0506
 3364 1076 0505
 3364 1077 0440
 3364 1100 2417
 3364 1101 4003
 3364 1102 1716
 3364 1103 2411
 3364 1104 1625
 3364 1105 0551
 3364 1106 4034
 3364
 3365 1107 1011
 3365 1110 2340
 3365 1111 2410
 3365 1112 0540
 3365 1113 0411
 3365 1114 0711
 3365 1115 2401
 3365 1116 1440
 3365 1117 2401
 3365 1120 2005
 3365 1121 4024
 3365 1122 2201
 3365 1123 1623
 3365 1124 2017
 3365
 3366 1125 2224
 3366 1126 4324
 3366 1127 1005
 3366 1130 4024
 3366 1131 2561
 3366 1132 6040
 3366 1133 1722
 3366 1134 4024
 3366 1135 1005
 3366 1136 4004
 3366 1137 0124
 3366 1140 2515
 3366
 3367 1141 7743
 3367 1142 5024
 3367 1143 3120
 3367 1144 0540
 3367 1145 2441
 3367 1146 1722
 3367 1147 4004
 3367 1150 5156
 -

USAF SAM 1977

(TYPE LINEFEED TO CONTINUE) \Z

MESS1, TEXT THIS THE DIGITAL TAPE TRANSPORT

THE TUIO OR THE DATUM?

3367	1151	4074	
3367			(TYPE T OR D). <01
3370	1152	6061	
3370	1153	4347	
3370			
3371	1154	4043	
3371	1155	1123	
3371	1156	4024	
3371	1157	1005	
3371	1160	4001	
3371	1161	5704	
3371	1162	4024	
3371	1163	0120	
3371	1164	0540	
3371	1165	1605	
3371	1166	2740	
3371			IS THE A/D TAPE NEW OR
3372	1167	1722	
3372	1170	4325	
3372	1171	2305	
3372	1172	0477	
3372	1173	4050	
3372	1174	2431	
3372	1175	2005	
3372	1176	4016	
3372	1177	4017	
3372	1200	2240	
3372	1201	2551	
3372	1202	5640	
3372	1203	7460	
3372			USED? (TYPE N OR U). <01
3373	1204	6143	
3373			
3374	1205	4740	
3374	1206	4301	
3374	1207	5704	
3374	1210	4022	
3374	1211	0505	
3374	1212	1440	
3374	1213	1617	
3374	1214	5640	
3374	1215	7460	
3374	1216	6634	
3374			A/D REEL NO. <0612
3375	1217	1027	
3375	1220	1114	
3375	1221	1440	
3375	1222	2410	
3375	1223	0540	
3375	1224	2001	
3375	1225	2201	
3375	1226	1505	
3375	1227	2405	
3375	1230	2223	
3375	1231	4006	
3375	1232	2217	
3375	1233	1540	
3375	1234	2410	
3375	1235	0540	
3375	1236	2022	
3375	1237	0526	
3375	1240	1117	
3375			MESS2, TEXT ZH WILL THE PARAMETERS FROM THE PREVIOUS

3376	1241	2523
3376	1242	4310
3376	1243	0611
3376	1244	1405
3376	1245	4002
3376	1246	0540
3376	1247	2523
3376	1250	0504
3376	1251	4001
3376	1252	0701
3376	1253	1116

HFILE BE USED AGAIN?

3377	1254	7740
3377	1255	4311
3377	1256	0640
3377	1257	2317
3377	1260	4024
3377	1261	3120
3377	1262	0540
3377	1263	1605
3377	1264	2740
3377	1265	2225
3377	1266	1640
3377	1267	2305
3377	1270	2211
3377	1271	0114
3377	1272	4016
3377	1273	2515
3377	1274	0205

IF SO TYPE NEW RUN SERIAL NUMBER

3400	1275	2240
3400	1276	4374

<08

3401	1277	6070
3401	1300	4301
3401	1301	1604
3401	1302	4023
3401	1303	2401
3401	1304	2224
3401	1305	1116
3401	1306	0740
3401	1307	0722
3401	1310	1725
3401	1311	2040
3401	1312	1625
3401	1313	1502
3401	1314	0522
3401	1315	4074
3401	1316	6064
3401	1317	4034

AND STARTING GROUP NUMBER <04 \Z

3402	1320	1005
3402	1321	3020
3402	1322	0522
3402	1323	1115
3402	1324	0516
3402	1325	2405
3402	1326	2272
3402	1327	4074

MESS3, TEXT ZH EXPERIMENTER: <20

3403	1330	6260
3403	1331	4305
3403	1332	3020

3403	1333	0522
3403	1334	1115
3403	1335	0516
3403	1336	2440
3403	1337	1104
3403	1340	7240
3403	1341	7462

EXPERIMENT ID: <20

3404	1342	0143
3404	1343	1217
3404	1344	0240
3404	1345	1722
3404	1346	0405
3404	1347	2240
3404	1350	1625
3404	1351	1502
3404	1352	0522
3404	1353	7240
3404	1354	7460

JOB ORDER NUMBER: <04

3405	1355	0443
3405	1356	2711
3405	1357	1414
3405	1360	4003
3405	1361	1001
3405	1362	1616
3405	1363	0514
3405	1364	4060
3405	1365	4002
3405	1366	0540
3405	1367	2523
3405	1370	0504
3405	1371	4001
3405	1372	2340
3405	1373	0116
3405	1374	4005
3405	1375	0411
3405	1376	2440
3405	1377	0310
3405	1400	0116
3405	1401	1605

WILL CHANNEL 0 BE USED AS AN EDIT CHANNEL?

3406	1402	1477
3406	1403	4350
3406	1404	2431
3406	1405	2005
3406	1406	4031
3406	1407	4017
3406	1410	2240
3406	1411	1651
3406	1412	4074

(TYPE Y OR N) <01

3407	1413	0061
3407	1414	4316
3407	1415	2515
3407	1416	0205
3407	1417	2240
3407	1420	1706
3407	1421	4003
3407	1422	1001
3407	1423	1616
3407	1424	0514
3407	1425	2340

3407	1426	1116
3407	1427	0314
3407	1430	2504
3407	1431	1116
3407	1432	0740
3407	1433	0504
3407	1434	1124

NUMBER OF CHANNELS INCLUDING EDITS

3410	1435	2343
3410	1436	5064
3410	1437	6240
3410	1440	4055
3410	1441	5555
3410	1442	5555
3410	1443	4040
3410	1444	6166
3410	1445	5172
3410	1446	4074

(02 ----- 16): <02

3411	1447	6062
3411	1450	4322
3411	1451	2516
3411	1452	4023
3411	1453	0522
3411	1454	1101
3411	1455	1440
3411	1456	1625
3411	1457	1502
3411	1460	0522
3411	1461	7240
3411	1462	7460

RUN SERIAL NUMBER: <08

3412	1463	7043
3412	1464	2324
3412	1465	0122
3412	1466	2411
3412	1467	1607
3412	1470	4007
3412	1471	2217
3412	1472	2520
3412	1473	4016
3412	1474	2515
3412	1475	0205
3412	1476	2272
3412	1477	4074

STARTING GROUP NUMBER: <04

3413	1500	6064
3413	1501	4301
3413	1502	1601
3413	1503	1417
3413	1504	0740
3413	1505	2205
3413	1506	0114
3413	1507	4024
3413	1510	1115
3413	1511	0540
3413	1512	1525
3413	1513	1424
3413	1514	1120
3413	1515	1411
3413	1516	0522
3413	1517	7240
3413	1520	7460

3413			ANALOG REAL TIME MULTIPLIER: <02
3414	1521	0243	
3414	1522	2301	
3414	1523	1520	
3414	1524	1411	
3414	1525	1607	
3414	1526	4006	
3414	1527	2205	
3414	1530	2125	
3414	1531	0516	
3414			SAMPLING FREQUENCY
3415	1532	0331	
3415	1533	4361	
3415	1534	5640	
3415	1535	6460	
3415	1536	6013	
3415	1537	1040	
3415	1540	4062	
3415	1541	5640	
3415	1542	6160	
3415	1543	6013	
3415	1544	1040	
3415	1545	4063	
3415	1546	5640	
3415	1547	6160	
3415	1550	1310	
3415	1551	4040	
3415	1552	6456	
3415	1553	4061	
3415			1. 400KM 2. 100KM 3. 10KM 4. 1KM
3416	1554	1310	
3416	1555	4365	
3416	1556	5640	
3416	1557	6160	
3416	1560	6010	
3416	1561	4040	
3416	1562	4066	
3416	1563	5640	
3416	1564	0530	
3416	1565	2405	
3416	1566	2216	
3416	1567	0114	
3416	1570	7240	
3416	1571	7460	
3416			5. 100M 6. EXTERNAL: <01
3417	1572	6143	
3417	1573	0411	
3417	1574	2611	
3417	1575	0405	
3417	1576	0440	
3417	1577	0231	
3417	1600	4061	
3417	1601	5564	
3417	1602	6071	
3417	1603	6572	
3417	1604	4074	
3417	1605	6064	
3417	1606	5400	
3417			DIVIDED BY 1-4095: <04\2
3420	1607	1040	
3420	1610	4003	
3420	1611	1001	
3420	1612	1616	

3420	1613	0514	
3420	1614	4011	
3420	1615	1606	
3420	1616	1722	
3420	1617	1501	
3420	1620	2411	
3420			MESS4, TEXT ZH CHANNEL INFORMATION
3421	1621	1716	
3421	1622	4347	
3421	1623	6060	
3421	1624	7462	
3421			00<20
3422	1625	6043	
3422	1626	4760	
3422	1627	6174	
3422			01<20
3423	1630	6260	
3423	1631	4347	
3423	1632	6062	
3423	1633	7462	
3423			02<20
3424	1634	6043	
3424	1635	4760	
3424	1636	6374	
3424			03<20
3425	1637	6260	
3425	1640	4347	
3425	1641	6064	
3425	1642	7462	
3425			04<20
3426	1643	6043	
3426	1644	4760	
3426	1645	6574	
3426			05<20
3427	1646	6260	
3427	1647	4347	
3427	1650	6066	
3427	1651	7462	
3427			06<20
3430	1652	6043	
3430	1653	4760	
3430	1654	6774	
3430			07<20
3431	1655	6260	
3431	1656	4347	
3431	1657	6070	
3431	1660	7462	
3431			08<20
3432	1661	6043	
3432	1662	4760	
3432	1663	7174	
3432			09<20
3433	1664	6260	
3433	1665	4347	
3433	1666	6160	
3433	1667	7462	
3433			10<20
3434	1670	6043	
3434	1671	4761	
3434	1672	6174	
3434			11<20
3435	1673	6260	
3435	1674	4347	

3435	1675	6162
3435	1676	7462
3435	1677	6054
3435		
3436		

12<20\Z
LISTAPE-1

ADAY	5362
ADCON	4323
ADOFF	0236
ADR	4702
ADRES	5734
ADDRESS	4705
AMOUR	5334
AMIN	5306
ANS1	6001
ANS2	6036
ANS3	6010
ANS4	6053
ANS5	6232
APDL	0401
API	4503
APION	6006
ASEC	5255
AVECT	0400
BAKSP	4072
BDAYS	5222
BEGIN	4022
BHOURS	5174
BMIN	5146
BSEC	5121
CHAN	5741
CHFLD	2461
CH0	5742
CH1	5743
CH10	5754
CH11	5755
CH12	5756
CH13	5757
CH14	5760
CH15	5761
CH2	5744
CH3	5745
CH4	5746
CH5	5747
CH6	5750
CH7	5751
CH8	5752
CH9	5753
CLEAR	4032
CLEER	5057
CLK	0420
CLOCK	4502
CN	5553
CODE	5412
CODE1	5670
CODE10	5677
CODE13	5700
CODE14	5701
CODE2	5671
CODE3	5672
CODE4	5673
CODE7	5674
CODE8	5675
CODE9	5676
COLON	5706
COMMND	0707
CONT	2053
COUNT	0706
DATFLD	4546

DATUM	1020
DECRIN	2403
DISPLA	2020
EHTCHN	4413
ELVCHN	4440
ENABLE	4251
EOF	0652
EOT	4742
EXIT	4704
EXIT2	5052
EXIT4	5610
FD	5441
FF	5471
FFTCHN	4466
FILD	2473
FILL	4615
FIVCHN	4366
FLAG	5711
FORCHN	4357
FPPDFF	0240
FR	5506
FRAME	4575
FRICHN	4461
GAP	0100
GROUP	5727
HDRADR	4167
HEADER	2434
HIADR	4671
HIBLOK	5667
HIGP	5732
IBM	4512
INT	0107
INTRPT	0403
INTRVL	5611
ITAPE	0105
IXSEVN	5737
IXTEN	5736
JMPADR	2315
JSW1	4473
JTAPE	5643
KBRD	4706
KCIF	0711
KCOM	0720
KJMS	1012
K0004	1017
K0010	0101
K0037	0402
K0100	0443
K0300	0446
K04000	0100
K10	5715
K100	5720
K1000	5723
K2	5713
K20	5716
K200	5721
K2000	5724
K4	5714
K4000	5725
K40	5717
K400	5722
K5100	0445
LNKFLD	4662
-	

LOAD	5576
LOADPM	4151
LOADR	4664
LOBLOK	5666
LOGP	5731
LOOP	2464
MAGTAP	0674
MAG3	0660
MAG4	0662
MAG5	0665
MASK	0712
MASKA	5710
MASKE	5704
MCHAN	5740
MCLA	6702
MESS0	7000
MESS1	7107
MESS2	7217
MESS3	7320
MESS4	7607
MINUS	5707
MKS	0721
MTAF	6712
MTCH	6714
MTCH	6711
MTGO	6722
MTLC	6716
MTRC	6724
MTRS	6706
MTSF	6701
MTTR	6721
NBYTE	0030
NDEX	2472
NEGTV	5703
NEWGP	4171
NEWRCO	4600
NEWTAP	4062
NINCHN	4422
NUMBER	0444
NXTDGT	2412
ONE	5712
PACLB	0634
PACEF	0633
PDL	0242
PRNT	5050
PUSHJ	6740
QR	7063
QU	7000
RC	5523
RCDFUL	5730
RCDISZ	4102
RCDSKP	5735
RCDTWO	4232
RDSIZE	5733
READ	0020
READWR	0654
REFSET	0672
REST	6771
RESTRT	2037
RET	5025
RETA	0671
RETURN	2433
REWIND	0650

REWIND	0010
WFLD	6773
RSTK	6774
RTAPE	0106
RUBOUT	5014
RV	5455
RVEC	6775
SAMRCD	4306
SAMXIT	4607
SC	5537
SEARCH	4034
SETCNT	0643
SETDAT	1000
SEVCHN	4404
SIXCHN	4375
SMV	6772
SP	5430
SPACE	5705
SPACEB	0070
SPACEF	0060
SPECL	2353
SSTK	6776
START	4122
STATUS	0710
STORE	5036
STROBE	5567
STUS	0110
SVEC	6777
SW1	5004
TABLE	2502
TAPE	4635
TAPEK	0716
TEMP	2417
TEMP1	2424
TEMP2	5702
TEMP3	2161
TENCHN	4431
TFLAG	0111
THRCHN	4350
TIME	5002
TM	0150
TRTCHN	4454
TSTCHR	5112
TTAPE	0104
TTY	5055
TU10	0600
TWCHN	4447
TWOCHN	4341
TYPET	5665
UNPAK	4542
VECCLK	0205
VECT	0200
WAIT	4255
WHERE	0705
WRAPUP	4612
WRIT	4640
WRITAP	4305
WRITE	0040
XSAMP	5726
XXXX	6704

APPENDIX B
MAXIMUM SAMPLING FREQUENCIES

Number of channels	Maximum A/D sampling frequency	Maximum D/A conversion frequency with dup tape	Record length or block size (in bytes)	Digital values per block (including Group No.)	Number of data frames per block (excluding Group No.)
2	3500	2800	2048	1024	511
3	2800	2240	2046	1023	340
4	2200	1760	2048	2014	255
5	1800	1440	2040	1020	203
6	1600	1280	2040	1020	169
7	1400	1120	2044	1022	145
8	1250	1000	2048	1024	127
9	1100	880	2034	1017	112
10	1025	820	2040	1020	101
11	975	780	2046	1023	92
12	900	720	2040	1020	84
13	850	680	2028	1014	77
14	800	640	2044	1022	72
15	760	608	2040	1020	67
16	700	560	2048	1024	63

APPENDIX C
D/A PROGRAM LISTING


```

0000      *20
0001      /DTGAIW  11 JUL 77
0002      /DIGITAL TO ANALOG DRIVE.
0003      /
0004      /KENNETH W. STEVENS
0005      /
0006      /
0007      PMODE
0010      /API COMMANDS.
0011      APION=6006
0012      PUSHJ=6760
0013      RESTI=6771
0014      SMLV=6772
0015      NFLO=6773
0016      NSTK=6774
0017      NVEC=6775
0020      SSTK=6776
0021      SVEC=6777
0022      /
0023      /END OF API COMMANDS.
0024      /
0025      *100
0026      REST=JMS I.
0027      SSVICE
0030      BINARY=JMS I.
0031      UDPRNT
0032      CLOCK=JMS I.
0033      CLK
0034      API=JMS I.
0035      INTRPT
0036      0100 0255 STATUS, 0
0037      0105 0001 TFLAG, 1
0040      0106 0001 PFLAG, 1
0041      0107 0000 CHAN, 0
0042      0110 0001 UNO, 1
0043      0111 0000 HIBLOK, 0
0044      0112 0000 LOBLOK, 0
0045      0113 0010 TEN, 10
0046      0114 5574 RUSIZ, NCOSIZ
0047      0115 5011 WRITAP, MGTAP2
0050      0116 4741 REETAP, MAGTAP
0051      0117 0223 VECTOR, POINTR
0052      0120 0000 COPY, 0
0053      0121 0000 COPY1, 0
0054      0122 5007 XITATE, EXIT8
0055      0123 5007 SW1, EXIT8
0056      0124 5000 POINTC, CNTUE
0057      0125 5007 PUINTN, EXIT8
0060      0126 7753 TAPEK1, 7753
0061      0127 7752 TAPEK2, 7752
0062      0130 0010 K0010, 10
0063      0131 0000 ADR1, 0
0064      0132 0427 COMNDW, 0427
0065      0133 1557 COMNDF, 1557
0066      0134 1447 COMND, 1447
0067      0135 5141 TEM3, TEMP3
0070      *200
0071      0200 7000 VECT, NOP
0072      0201 7402 HLT
0073      0202 7000 NOP
0074      0203 7402 HLT
0075      0204 5605 JMP I, +1

                                /START OF VECTOR TABLE.
                                /PFM POWER FAIL
                                /LINC TAPE

```

0076	0205	0236	VECCLK, ADOFF	/KW12A CLOCK
0077	0206	7000	NOP	
0100	0207	7402	HLT	/(TSS) TIME SHARE
0101	0210	5611	JMP I.+1	
0102	0211	0240	TTY	/TTY PRINTER (YOURS)
0103	0212	5613	JMP I.+1	
0104	0213	5160	KBRD	/TTY KBRD (YOURS)
0105	0214	7000	NOP	
0106	0215	7402	HLT	/TTY REMOTE (KYBD)
0107	0216	7000	NOP	
0110	0217	7402	HLT	/TTY REMOTE (PRT)
0111	0220	7000	NOP	
0112	0221	7402	HLT	/PLOTTER
0113	0222	5623	JMP I.+1	
0114	0223	4741	POINTN, MAGTAP	/MAGTAPE
0115	0224	7000	NOP	
0116	0225	7402	HLT	
0117	0226	7000	NOP	
0120	0227	7402	HLT	/"
0121	0230	5631	JMP I.+1	
0122	0231	4741	MAGTAP	/WANG MAGTAPE.
0123	0232	7000	NOP	
0124	0233	7402	HLT	/"
0125	0234	7000	NOP	
0126	0235	7402	HLT	
0127			/	
0130			/	END OF VECTOR TABLE
0131			/	
0132	0236	6135	ADOFF, CLSA	/INTERRUPTS TO HERE
0133	0237	4500	REST	/WHEN NOT CONVERTING.
0134	0240	6201	TTY, CDF 0	/TELETYPE INTERRUPTS
0135	0241	7200	CLA	/TO HERE.
0136	0242	1507	TAD I CHAR	
0137	0243	7450	SNA	
0140	0244	5250	JMP .+4	
0141	0245	6046	TLB	
0142	0246	2107	ISZ CHAR	
0143	0247	4500	REST	
0144	0250	6042	TCF	
0145	0251	2106	ISZ PFLAG	
0146	0252	4500	REST	
0147	0253	7402	HLT	
0150	0254	0265	AAPOL, PUL	
0151	0255	0000	SRVICE, 0	
0152	0256	7200	CLA	
0153	0257	6774	MSJK	
0154	0260	1110	TAD UNO	
0155	0261	1254	TAD AAPOL	
0156	0262	7440	SZA	
0157	0263	6771	RESTI	
0160	0264	7402	HLT	
0161	0265	0000	PDL, 0	/START OF PUSH DOWN LIST.
0162			/	
0163			/	
0164				*400
0165			/	
0166			/	
0167	0400	0200	AVECT, VECT	
0170	0401	0265	APOL, PUL	
0171	0402	0037	K0037, 0037	
0172	0403	0000	INTRPT, 0	
0173	0404	7200	CLA	
0174	0405	1202	TAD K0037	

0175	0406	6772	/	SMLV	
0176			/		
0177			/	PUSH DOWN LIST IS IN LOW 4K	
0200			/	VECTOR FIELD IS IN LOW 4K	
0201			/	ALL INTERRUPTS ARE PERMITTED	
0202			/		
0203	0407	7200		CLA	
0204	0410	1201		TAD APDL	
0205	0411	6776		SSTK	
0206			/		
0207			/	PUSH DOWN STACK IS IN	
0210			/	PMODE PAGE 1 FIELD 0	
0211			/	PDL-400	
0212			/	THIS SHOULD ALLOW UP TO 19	
0213			/	PENDING INTERRUPTS	
0214			/		
0215	0412	7200		CLA	
0216	0413	1200		TAD AVECT	
0217	0414	6777		SVEC	
0220			/		
0221	0415	7200		CLA	
0222	0416	6006		APION	
0223	0417	5603		JMP I INTRPT	
0224			/	VECTOR TABLE ADDRESS IS	
0225			/	VECT	
0226			/		
0227			/		
0230			/		
0231			/		
0232			/		
0233			/	KW12A CLOCK HANDLER	
0234			/		
0235			/		
0236			/		
0237	0420	0000	CLK,	0	
0240	0421	7300		CLA CLL	/START THE CLOCK.
0241	0422	6133		CLAB	
0242	0423	6132		CLLR	
0243	0424	6135		CLSA	
0244	0425	7200		CLA	
0245	0426	1243		TAD K0100	
0246	0427	6132		CLLR	
0247	0430	6135		CLSA	
0250	0431	7200		CLA	
0251	0432	1244		TAD NUMBER	/SET UP CLOCK BUFFER
0252	0433	6133		CLAB	/PRESET THE BPR FOR C
0253	0434	7200		CLA	
0254	0435	1246		TAD K0300	
0255	0436	6134		CLEN	/LOAD CK ENABLE
0256	0437	7200		CLA	
0257	0440	1245		TAD K5100	
0260	0441	6132		CLLR	
0261	0442	5620		JMP I CLK	
0262			/		
0263			/	/NUMBER, IS THE COUNTS BEFORE INTERRUPT	
0264			/		
0265			/	/K5100, IS THE CLOCK CONTROL REG.	
0266			/		
0267			/	/K0300, SETS THE INTERRUPT ENABLE	
0270			/		
0271			/	/K0100, USED TO GET A MODE CHANGE	
0272			/		
0273	0443	0100		K0100, 0100	

```

0274      0444 4575 NUMBER, =3203
0275      0445 2100 K5100, 2100
0276      0446 0300 K0300, 0300
0277      /
0300      /
0301      /
0302      /
0303      /      28 JAN 1974
0304      /
0305      /
0306      MTSF=6701
0307      /SKIP ON ERROR FLAG, OR MAGNETIC TAPE FLAG
0310      /
0311      MTCR=6711
0312      /SKIP ON T.C. READY
0313      /
0314      MTTR=6721
0315      /SKIP ON T.T. READY
0316      /
0317      MTAF=6712
0320      /CLEAR REGISTERS AND FLAGS
0321      /
0322      MTRC=6724
0323      /INCLUSIVE "OR" C(CR) TO C(AC)
0324      /
0325      MTCM=6714
0326      /INCLUSIVE "OR" C(AC) TO C(CR)
0327      /BITS 0-5 AND 9-11, JAM BITS 6,7,8 TO AC
0330      /
0331      MTLC=6716
0332      /LOAD COMMAND REGISTER
0333      /
0334      XXXX=6704
0335      /INCLUSIVE "OR" C(S,R,) TO C(AC)
0336      /
0337      MTRS=6706
0340      /READ STATUS REGISTER
0341      /
0342      MTGO=6722
0343      /MAG TAPE GO
0344      /
0345      MCLA=6702
0346      /CLEAR AC
0347      /
0350      /COMMANDS ARE AVAILABLE TO SPACE FILES
0351      /FORWARDS OR BACKWARDS
0352      /
0353      /
0354      /CCRC      =0/UNIT SELECTION
0355      /      1
0356      /      2
0357      /PARITY      =3/0=EVEN,1=ODD
0360      /CORE DUMP  =4/1=CORE DUMP
0361      /EXIRC      =5/3 INCH IRC
0362      /COMMAND    =6/COMMAND REGISTER
0363      /      7
0364      /      8
0365      /FLAGS      =9/DISABLE,1=ENABLE
0366      /DENSITY    =10/
0367      /      11
0370      /
0371      /
0372      /
-

```



```

0373 / ERROR CODES IN AC
0374 /
0375 / 0. ERROR FLAG TOTAL
0376 / 1. TAPE REWINDING
0377 / 2. BEGINNING OF TAPE (BOT)
0400 / 3. ILLEGAL COMMAND
0401 / 4. PARITY (LATERAL OR LONGITUDAL)
0402 / 5. END OF FILE (EOF)
0403 / 6. END OF TAPE (EOT)
0404 / 7. READ/COMPARE ERROR
0405 / 8. RECORD LENGTH INCORRECT
0406 / WC=0 LONG
0407 / WC=/0 SHORT
0410 / 9. DATA REQUEST LATE
0411 / 10. BAD TAPE
0412 / 11. JOB DONE (MTF)
0413 /
0414 /
0415 /
0416 / THE END
0417 /
0420 *1200
0421 /UNSIGNED DECIMAL PRINT, DOUBLE PRECISION
0422 /CALLING SEQUENCE: JMS UDPRNT /SUBROUTINE CALLED
0423 / HI ADDR /ADDRESS OF HIGH ORDER WORD
D
0424 / POINTER /ADDRESS OF FIRST WORD OF
ANSWER.
0425 / RETURN /RETURN WITH AC AND L CLEA
R
0426 /
0427 / PMODE
0430 /
0431 1200 0000 UDPRNT, 0
0432 1201 7300 CLA CLL
0433 1202 1600 TAD I UDPRNT /PICK UP ADDRESS OF HIGH-0
RDER WORD
0434 1203 3306 DCA UDGET
0435 1204 1706 TAD I UDGET /PICK UP BOTH WORDS FOR US
E IN SUBROUTINE
0436 1205 3300 DCA UDHIGH
0437 1206 2306 ISZ UDGET
0440 1207 1706 TAD I UDGET
0441 1210 3301 DCA UDLOW
0442 1211 1272 TAD UDLOOP /INITIALIZE DIGIT COUNTER
FOR "8"
0443 1212 3277 DCA UDCNT
0444 1213 1273 TAD UDADUR /INITIALIZE TO TABLE OF PD
WERS OF TEN
0445 1214 3307 DCA UDPTH
0446 1215 2200 ISZ UDPRNT
0447 1216 1600 TAD I UDPRNT /
0450 1217 3310 DCA UDADRS
0451 1220 3275 DCA FLAG
0452 1221 2200 ISZ UDPRNT /INDEX LINKAGE FOR CORRECT
RETURN
0453 1222 1707 UDARN0, TAD I UDPTH /PICK UP CURRENT POWER OF
TEN FOR
0454 1223 2307 ISZ UDPTH /USE IN SUBTRACTION
0455 1224 3302 DCA UDMSUB
0456 1225 1707 TAD I UDPTH
0457 1226 2307 ISZ UDPTH
0460 1227 3303 DCA UDLSUB

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0461	1230	7100	UDDO, ION	CLL	/DOUBLE PRECISION SUBTRACT
0462	1231	1303		TAD UDLSUB	
0463	1232	1301		TAD UDLOW	
0464	1233	3305		DCA UDTEML	
0465	1234	7004		RAL	
0466	1235	1302		TAD UDMSUB	
0467	1236	1300		TAD UDHIGH	
0470	1237	7420		SNL	/DID IT UNDERFLOW?
0471	1240	5246		JMP UDDOUT	/NO, COUNT IS DONE
0472	1241	2304		ISZ UDBOX	/YES, COUNT NOT DONE YET.
			INDEX DIGIT		
0473	1242	3300		DCA UDHIGH	/DEPOSIT REMAINING PORTION
			S OF WORD		
0474	1243	1305		TAD UDTEML	
0475	1244	3301		DCA UDLOW	
0476	1245	5230		JMP UDDO	/GO BACK AND SUBTRACT AGAI
			N		
0477	1246	7200	UDDOUT,	CLA	
0500	1247	1275		TAD FLAG	
0501	1250	7440		SZA	
0502	1251	5260		JMP .+7	
0503	1252	1304		TAD UDBOX	
0504	1253	7440		SZA	
0505	1254	5257		JMP .+3	
0506	1255	1274		TAD UDSPACE	
0507	1256	5263		JMP .+5	
0510	1257	2275		ISZ FLAG	
0511	1260	7200		CLA	
0512	1261	1304		TAD UDBOX	/PICK UP RESULTING DIGIT
0513	1262	1276		TAD UDTWO	/ADD "260" TO IT
0514	1263	3710		DCA I UDAORS	
0515	1264	2310		ISZ UDAORS	
0516	1265	7300		CLA CLL	
0517	1266	3304		DCA UDBOX	/INITIALIZE DIGIT TO "0"
0520	1267	2277		ISZ UDCNT	/HAVE WE TYPED "8" DIGITS
0521	1270	5222		JMP UDARND	/NO, DETERMINE NEXT DIGIT
0522	1271	5600		JMP I UDPRNT	/YES, SUBROUTINE DONE. RET
			URN		
0523	1272	7770	UDLOOP,	-10	/COUNT OF "8" DIGITS
0524	1273	1311	UDADDR,	UDCON1	/INITIAL ADDRESS OF POWERS
			OF TEN		
0525	1274	0240	UDSPACE,	240	
0526	1275	0000	FLAG,	0	
0527	1276	0260	UDTWO,	260	/ICODE FOR DIGITS
0530	1277	0000	UDCNT,	0	/STORAGE LOCATIONS
0531	1300	0000	UDHIGH,	0	
0532	1301	0000	UDLOW,	0	
0533	1302	0000	UDMSUB,	0	
0534	1303	0000	UDLSUB,	0	
0535	1304	0000	UDBOX,	0	
0536	1305	0000	UDTEML,	0	
0537	1306	0000	UDGET,	0	
0540	1307	0000	UDPTR,	0	
0541	1310	0000	UDADRS,	0	
0542	1311	3166	UDCON1,	3166	/POWERS OF TEN
0543	1312	4600		4600	/-10,000,000
0544	1313	7413		7413	/-1,000,000
0545	1314	6700		6700	
0546	1315	7747		7747	/-100,000
0547	1316	4540		4540	
0550	1317	7775		7775	/-10,000
0551	1320	4360		4360	

0552	1321	7777	7777	/-1,000
0553	1322	6030	6030	
0554	1323	7777	7777	/-100
0555	1324	7634	7634	
0556	1325	7777	7777	/-10
0557	1326	7766	7766	
0560	1327	7777	7777	/-1
0561	1330	7777	7777	
0562		/		
0563		/		
0564		/		
0565		/		
0566			LMODE	
0567			SEGMENT 1	
0570		/QANDA1	COMMANDS	
0571			QU=JMP 1000	
0572			QR=JMP 1063	
0573		/END OF	QANDA1 COMMANDS	
0574			*20	
0575	0020	1000	DISPLA, LDA	
0576	0021	0000	0	
0577	0022	4035	STC EXIT6	
0600	0023	0643	LDF 3	
0601	0024	7000	QU	/QUESTION AND ANSWER
0602	0025	3000	MESS112000	/PORTION STARTS HERE.
0603	0026	0016	NOP	
0604	0027	7063	QR	
0605	0030	7000	QU	
0606	0031	3046	MESS412000	
0607	0032	2000	ANS412000	
0610	0033	7063	QR	
0611	0034	0602	LIF 2	
0612	0035	0000	EXIT6, 0000	/EXIT Q AND A PORTION.
0613	0036	4006	DEC8IN, STC 6	/DECIMAL TO BINARY
0614	0037	1000	LDA	/CONVERSION ROUTINE.
0615	0040	0000	0	
0616	0041	4067	STC RETURN	
0617	0042	4057	STC TEMP1	
0620	0043	0065	SET I 5	
0621	0044	7774	-3	
0622	0045	1326	NXTDGT, LDH I 6	
0623	0046	1560	BCL 1	
0624	0047	7760	7760	
0625	0050	2057	ADD TEMP1	
0626	0051	1060	STA I	
0627	0052	0000	TEMP2, 0000	
0630	0053	0242	NOL 2	
0631	0054	2052	ADD TEMP2	
0632	0055	0241	NOL 1	
0633	0056	1060	STA I	
0634	0057	0000	TEMP1, 0000	
0635	0060	0225	XSK I 5	
0636	0061	6045	JMP NXTDGT	
0637	0062	1326	LDH I 6	
0640	0063	1560	BCL 1	
0641	0064	7760	7760	
0642	0065	2057	ADD TEMP1	
0643	0066	0602	LIF 2	
0644	0067	0000	RETURN, 0000	
0645			SEGMENT 2	
0646			*20	
0647	0020	0601	LIF 1	/PROGRAM STARTS HERE.
0650	0021	6020	JMP DISPLA	

0651	0022	1300	DECODE, LDH	
0652	0023	2005	2005	
0653	0024	1560	BCL I	
0654	0025	7760	7760	
0655	0026	0251	KOL 9	
0656	0027	3557	ADD K100	
0657	0030	0640	LDF 0	
0660	0031	1040	STA	
0661	0032	2445	K510012000	
0662	0033	1460	SAE I	
0663	0034	6100	6100	
0664	0035	6041	JMP .+4	
0665	0036	1020	LDA I	
0666	0037	0320	0320	
0667	0040	6043	JMP .+3	
0670	0041	1020	LDA I	
0671	0042	0300	0300	
0672	0043	1040	STA	
0673	0044	2446	K030012000	
0674	0045	0643	LDF 3	
0675	0046	1020	LDA I	
0676	0047	0005	0005	
0677	0050	0601	LIF 1	
0700	0051	0036	JMP DECBIN	
0701	0052	0017	COM	
0702	0053	3562	ADD ONE	
0703	0054	0640	LDF 0	
0704	0055	1040	STA	
0705	0056	2444	NUMBER12000	
0706	0057	0643	LDF 3	
0707	0060	1300	LDH	
0710	0061	6000	6000	
0711	0062	0640	LDF 0	
0712	0063	1040	STA	
0713	0064	2120	COPY12000	
0714	0065	1040	STA	
0715	0066	2121	COPY112000	
0716	0067	0643	LDF 3	
0717	0070	0024	SFA	
0720	0071	1620	HSE I	
0721	0072	0020	20	
0722	0073	0004	ESF	
0723	0074	0002	PDP	
0724			PMODE	
0725	4075	4502	CLOCK	/SET UP CLOCK.
0726	4076	4503	API	/SET UP AUTO INTERRUPT.
0727	4077	6141	LINC	
0730			LMODE	
0731	0100	7021	JMP REWIND	
0732	0101	0011	CLR	
0733	0102	5570	STC FILHI	
0734	0103	5571	STC FILCNT	
0735	0104	0643	LDF 3	
0736	0105	1020	NEWFIL, LDA I	
0737	0106	4000	4000	
0740	0107	5574	STC NCDS12	
0741	0110	0640	LDF 0	
0742	0111	1040	STA	
0743	0112	2131	AOR112000	
0744	0113	1040	STA	
0745	0114	2112	LOBLOK12000	
0746	0115	1040	STA	
0747	0116	2111	HIBLOK12000	

/PICK UP COPY TAPE
/DIRECTIVE FROM ANSWER
/FIELD AND STORE IT
/FOR FUTURE USE.

/SET UP CLOCK.
/SET UP AUTO INTERRUPT.

/TO HERE WHEN A NEW FILE
/IS ENCOUNTERED.

0750	0117	3562	ADD ONE	
0751	0120	1140	ADM	
0752	0121	1571	FILCNT	
0753	0122	0011	CLR	
0754	0123	0002	PDP	
0755			PMODE	
0756	4124	1125	TAD POINTN	/SET SW1 SUCH THAT
0757	4125	3123	UCA SW1	/NO COPY WILL BE MADE.
0760	4126	1121	TAD COPY1	
0761	4127	3120	UCA COPY	
0762	4130	6141	LINC	
0763			LMODE	
0764	0131	6706	JMP REED	/READ FIRST BLOCK OF FILE.
0765	0132	0002	PDP	
0766			PMODE	
0767	4133	7200	CLA	
0770	4134	1105	TAD TFLAG	
0771	4135	7450	SNA	
0772	4136	5334	JMP .-2	
0773	4137	7200	CLA	
0774	4140	1104	TAD STATUS	
0775	4141	6141	LINC	
0776			LMODE	
0777	0142	1560	BCL I	
1000	0143	7677	7677	
1001	0144	1040	STA	
1002	0145	1555	STAS	
1003	0146	1460	SAE I	
1004	0147	0100	100	
1005	0150	6152	JMP .+2	
1006	0151	7142	JMP FINISH	
1007	0152	0002	PDP	
1010			PMODE	
1011	4153	4501	BINARY	
1012	4154	5570	FILHI	
1013	4155	6743	6743	
1014	4156	6141	LINC	
1015			LMODE	
1016	0157	1020	LDA I	
1017	0160	6716	FILNUM16000	
1020	0161	7120	JMP TYP0UT	/PRINT FILE NUMBER.
1021	0162	7054	JMP EBCDIC	
1022	0163	1020	LDA I	
1023	0164	6050	HEADR16000	
1024	0165	7120	JMP TYP0UT	
1025	0166	1020	LDA I	
1026	0167	6020	6020	/ABSOLUTE ADDRESS OF HEADINGS.
1027	0170	7120	JMP TYP0UT	
1030	0171	0005	SET I 5	
1031	0172	3761	3761	
1032	0173	0644	LDF 4	
1033	0174	0006	SET I 6	
1034	0175	1573	TEMP4	
1035	0176	1025	PARAMS, LDA I 5	
1036	0177	1560	BCL I	
1037	0200	7760	7760	
1040	0201	0250	ROL 8	
1041	0202	5572	STC TEMP	
1042	0203	1025	LDA I 5	
1043	0204	1560	BCL I	
1044	0205	7400	7400	
1045	0206	3572	ADD TEMP	
1046	0207	1066	STA I 6	

1047	0210	0205	XSK 5	
1050	0211	6176	JMP PARAMS	
1051	0212	0640	LDF 0	
1052	0213	1000	LDA	
1053	0214	2120	COPY 12000	/WILL A COPY BE
1054	0215	0470	AZE I	/MADE? IF SO CONTINUE,
1055	0216	6260	JMP RENTER	/IF NOT JMP TO RENTER.
1056	0217	0002	PUP	
1057			Pmode	
1060	4220	7200	CLA	
1061	4221	1115	TAD WRITAP	
1062	4222	5517	UCA I VECTOR	
1063	4223	1124	TAD POINTC	
1064	4224	3123	UCA SW1	
1065	4225	6141	LINC	
1066			Lmode	
1067	0226	0065	SET I 5	
1070	0227	2000	2000	
1071	0230	0066	SET I 6	
1072	0231	7767	-10	
1073	0232	0067	SET I 7	
1074	0233	2006	2006	
1075	0234	0643	ATOEBC, LDF 3	/ASCII TO EBCDIC CONVER-
1076	0235	1325	LDM I 5	/SION ROUTINE.
1077	0236	1120	ADA I	
1100	0237	1455	TABLE1	
1101	0240	4242	STC NDEX	
1102	0241	1000	LDA	
1103	0242	0000	NDEX, 0000	
1104	0243	0644	LDF 4	
1105	0244	1067	STA I 7	
1106	0245	0226	XSK I 6	
1107	0246	6234	JMP ATOEBC	/END OF ASCII TO EBCDIC
1110	0247	0011	CLR	/ROUTINE.
1111	0250	0640	LDF 0	
1112	0251	1040	STA	
1113	0252	2131	ADR112000	
1114	0253	6660	JMP WRIT	
1115	0254	0002	PUP	
1116			Pmode	
1117	4255	6721	MTTR	
1120	4256	5255	JMP .-1	
1121	4257	6141	LINC	
1122			Lmode	
1123	0260	1020	RENTER, LDA I	
1124	0261	0644	LDF 4	
1125	0262	1040	STA	
1126	0263	1337	UFLO	
1127	0264	4344	STC PAK	
1130	0265	5551	STC SW2	
1131	0266	5565	STC IGROUP	
1132	0267	3575	ADD ADRESS	
1133	0270	0640	LDF 0	
1134	0271	1040	STA	
1135	0272	2131	ADR112000	
1136	0273	0642	LDF 2	
1137	0274	5560	STC SWITCH	
1140	0275	0050	TAPE, SET 10	
1141	0276	1577	IXTEN	
1142	0277	0640	LDF 0	
1143	0300	1000	LDA	
1144	0301	2131	ADR112000	
1145	0302	1120	ADA I	

1146	0303	4000	4000
1147	0304	1560	BCL I
1150	0305	0001	I
1151	0306	1040	STA
1152	0307	2131	ADR112000
1153	0310	0706	JMP REED
1154	0311	1000	LDA
1155	0312	1560	SWITCH
1156	0313	0470	AZE I
1157	0314	6340	JMP REFIL
1160	0315	0002	PUP
1161			Pmode
1162	4316	7200	CLA
1163	4317	1105	TAD TFLAG
1164	4320	7450	SNA
1165	4321	5317	JMP .-2
1166	4322	7200	CLA
1167	4323	1104	TAD STATUS
1170	4324	6141	LINC
1171			Lmode
1172	0325	1560	BCL I
1173	0326	7677	7677
1174	0327	1040	STA
1175	0330	1555	STAS
1176	0331	1460	SAE I
1177	0332	0100	100
1200	0333	6335	JMP .+2
1201	0334	6463	JMP CONVRT
1202	0335	0011	CLR
1203	0336	5560	STC SWITCH
1204	0337	6475	JMP PRINT
1205	0340	0042	REFIL, SET 2
1206	0341	1601	MCHAN
1207	0342	0067	SET I 7
1210	0343	1602	CHAN
1211	0344	0644	PAK, LDF 4
1212	0345	1030	LDA I 10
1213	0346	0250	NOL 8
1214	0347	1560	BCL I
1215	0350	0377	0377
1216	0351	5572	STC TEMP
1217	0352	1030	LDA I 10
1220	0353	1560	BCL I
1221	0354	7400	7400
1222	0355	3572	ADD TEMP
1223	0356	1067	STA I 7
1224	0357	0210	XSK 10
1225	0360	6377	JMP FRAME
1226	0361	0011	CLR
1227	0362	2344	ADD PAK
1230	0363	3562	ADD ONE
1231	0364	1560	BCL I
1232	0365	0014	14
1233	0366	3564	ADD K4
1234	0367	1040	STA
1235	0370	0344	PAK
1236	0371	1040	STA
1237	0372	1337	UFLD
1240	0373	1560	BCL I
1241	0374	7776	7776
1242	0375	0470	AZE I
1243	0376	6410	JMP WAIT
1244	0377	0222	FRAME, XSK I 2

/END OF LINC FIELD?
/NO.

/END OF RECORD?
/YES.
/NO,END OF FRAME?

1245	0400	6344	JMP PAK	/NO.
1246	0401	1000	LDA	/YES
1247	0402	1561	SW2	
1250	0403	0470	AZE I	
1251	0404	0401	JMP .-3	
1252	0405	0011	CLR	
1253	0406	5561	STC SW2	
1254	0407	6340	JMP REFIL	
1255	0410	1000	WAIT, LDA	/WAIT FOR CLOCK INTERRUPT.
1256	0411	1561	SW2	
1257	0412	0470	AZE I	
1260	0413	0410	JMP .-3	
1261	0414	0011	CLR	
1262	0415	5561	STC SW2	
1263	0416	0002	PDP	
1264			PMODE	
1265	4417	7200	CLA	
1266	4420	1104	TAD STATUS	
1267	4421	6141	LINC	
1270			LMODE	
1271	0422	1040	STA	
1272	0423	1573	TEMP4	
1273	0424	1560	BCL I	
1274	0425	7577	7577	
1275	0426	0470	AZE I	/CHECK FOR PARITY ERROR.
1276	0427	6441	JMP NOPRTY	
1277	0430	0643	LDF 3	
1300	0431	0002	PDP	
1301			PMODE	
1302	4432	4501	BINARY	
1303	4433	0111	HIBLOK	
1304	4434	6642	6642	/PARITY+10
1305	4435	6141	LINC	
1306			LMODE	
1307	0436	1020	LDA I	
1310	0437	6630	PARITY,6000	
1311	0440	7120	JMP TYP0UT	/PRINT BLOCK NUMBER OF
1312	0441	1000	NOPRTY, LDA	/PARITY.
1313	0442	1573	TEMP4	
1314	0443	1560	BCL I	
1315	0444	7677	7677	
1316	0445	1040	STA	
1317	0446	1555	STAS	
1320	0447	1460	SAE I	/CHECK FOR END OF FILE
1321	0450	0100	100	
1322	0451	6475	JMP PRINT	/IF NO, GO TO PRINT.
1323	0452	1020	LDA I	
1324	0453	0236	ADOFF	
1325	0454	0640	LDF 0	
1326	0455	1040	STA	/STOP D/A CONVERSION
1327	0456	2205	VECCLK,2000	/BETWEEN FILES.
1330	0457	0015	MTA	
1331	0460	1560	BCL I	/TURN OFF RELAY 0.
1332	0461	4040	4040	
1333	0462	0014	ATR	
1334	0463	0643	CONVRT, LDF 3	
1335	0464	0002	PDP	
1336			PMODE	
1337	4465	4501	BINARY	
1340	4466	0111	HIBLOK	
1341	4467	6672	6672	/ENDFIL+10
1342	4470	6141	LINC	
1343			LMODE	

1344	0471	1020	LOA I	
1345	0472	6660	ENDFIL16000	
1346	0473	7120	JMP TYP0UT	/PRINT EOF AND LAST
1347	0474	6105	JMP NEWFIL	/BLOCK NUMBER OF FILE.
1350	0475	7334	JMP GRPCHN	
1351	0476	1000	LOA	
1352	0477	1567	GROUP	
1353	0500	1440	SAE	/CHECK FOR NEW GROUP.
1354	0501	1565	IGROUP	
1355	0502	6504	JMP .+2	
1356	0503	6275	JMP TAPE	
1357	0504	5565	STC IGROUP	
1360	0505	1020	LOA I	
1361	0506	0236	ADOFF	
1362	0507	0640	LDF 0	
1363	0510	1040	STA	/STOP D/A CONVERSION
1364	0511	2205	VECCLK12000	/BETWEEN GROUPS.
1365	0512	0015	KTA	
1366	0513	1560	BCL I	/TURN OFF RELAY 0.
1367	0514	4040	4040	
1370	0515	0014	ATR	
1371	0516	0002	PDP	
1372			PMODE	
1373	4517	4501	BINARY	
1374	4520	5566	HIGRUP	
1375	4521	6602	6602	/GRPNUM+2
1376	4522	4501	BINARY	
1377	4523	0111	HIBLOK	
1400	4524	6612	6612	/GRPNUM+10
1401	4525	6141	LINC	
1402			LMODE	
1403	0526	0643	LDF 3	
1404	0527	1020	LOA I	
1405	0530	6600	GRPNUM16000	
1406	0531	7120	JMP TYP0UT	/PRINT GROUP NUMBER AND
1407	0532	0002	PDP	/STARTING BLOCK NUMBER.
1410			PMODE	
1411	4533	7200	CLA	
1412	4534	1106	TAD PFLAG	
1413	4535	7450	SNA	
1414	4536	5334	JMP .-2	
1415	4537	6141	LINC	
1416			LMODE	
1417	0540	0015	KTA	
1420	0541	1620	USE I	/TURN ON RELAY 0.
1421	0542	4040	4040	
1422	0543	0014	ATR	
1423	0544	1020	LOA I	
1424	0545	4552	UACON	
1425	0546	0640	LDF 0	
1426	0547	1040	STA	/START D/A CONVERSION PROCESS.
1427	0550	2205	VECCLK12000	
1430	0551	6275	JMP TAPE	
1431			PMODE	
1432	4552	6141	LINC	/ D/A CONVERSION BEGINS
1433			LMODE	/HERE.
1434	0553	0067	SET I 7	
1435	0554	1602	CHAN	
1436			//////////	
1437	0555	0445	SNS 5	/THIS CODING ALLOWS THE
1440	0556	6563	JMP .+5	/OPERATOR TO USE SENSE
1441	0557	1020	LOA I	/SWITCHES 5, 4, AND 3 TO
1442	0560	0001	1	/CONVERT CHANNELS 12 - 15.

1443	0561	1140	ADM
1444	0562	0007	7
1445	0563	0444	SNS 4
1446	0564	6571	JMP ,+5
1447	0565	1020	LDA I
1450	0566	0002	2
1451	0567	1140	ADM
1452	0570	0007	7
1453	0571	0443	SNS 3
1454	0572	6577	JMP ,+5
1455	0573	1020	LDA I
1456	0574	0004	4
1457	0575	1140	ADM
1460	0576	0007	7
1461			////////////////////
1462	0577	1027	LDA I 7
1463	0600	0500	IOB
1464	0601	6551	6551
1465	0602	1027	LDA I 7
1466	0603	0500	IOB
1467	0604	6552	6552
1470	0605	1027	LDA I 7
1471	0606	0500	IOB
1472	0607	6553	6553
1473	0610	1027	LDA I 7
1474	0611	0500	IOB
1475	0612	6554	6554
1476	0613	1027	LDA I 7
1477	0614	0500	IOB
1500	0615	6555	6555
1501	0616	1027	LDA I 7
1502	0617	0500	IOB
1503	0620	6556	6556
1504	0621	1027	LDA I 7
1505	0622	0500	IOB
1506	0623	6561	6561
1507	0624	1027	LDA I 7
1510	0625	0500	IOB
1511	0626	6562	6562
1512	0627	1027	LDA I 7
1513	0630	0500	IOB
1514	0631	6563	6563
1515	0632	1027	LDA I 7
1516	0633	0500	IOB
1517	0634	6564	6564
1520	0635	1027	LDA I 7
1521	0636	0500	IOB
1522	0637	6565	6565
1523	0640	1027	LDA I 7
1524	0641	0500	IOB
1525	0642	6566	6566
1526	0643	1020	EXIT, LDA I
1527	0644	0001	1
1530	0645	5561	STC SW2
1531	0646	0002	PDP
1532			Pmode
1533	4647	6135	CLSA
1534	4650	4500	NEST
1535			Lmode
1536	0651	1000	WHITFL, LDA
1537	0652	0000	0
1540	0653	4705	STC EXIT1
1541	0654	0002	PDP

1542			Pmode	
1543	4655	7300	CLA CLL	
1544	4656	1133	TAD COMNDF	
1545	4657	5274	JMP LOAD	
1546			Lmode	
1547	0660	1000	WRIT, LDA	/WRITE TAPE ROUTINE.
1550	0661	0000	0	
1551	0662	4705	STC EXIT1	
1552	0663	0002	PDP	
1553			Pmode	
1554	4664	6201	CDF 0	
1555	4665	7340	CLA CLL CMA	
1556	4666	1131	TAD ADR1	
1557	4667	5526	UCA I TAPEK1	
1560	4670	1514	TAD I RDSIZ	
1561	4671	7041	CIA	
1562	4672	3527	UCA I TAPEK2	
1563	4673	1134	TAD COMND	
1564	4674	6711	LOAD, MTCR	
1565	4675	5274	JMP .-1	
1566	4676	6716	MTLC	
1567	4677	7200	CLA	
1570	4700	6721	MTTR	
1571	4701	5300	JMP .-1	
1572	4702	1130	TAD K0010	
1573	4703	6722	MTGO	
1574	4704	6141	LINC	
1575			Lmode	
1576	0705	0000	EXIT1, 0	
1577	0706	1000	REED, LDA	/READ TAPE ROUTINE.
1600	0707	0000	0	
1601	0710	4740	STC EXIT2	
1602	0711	0002	PDP	
1603			Pmode	
1604	4712	1105	TAD TFLAG	
1605	4713	7450	SNA	
1606	4714	5312	JMP .-2	
1607	4715	7200	CLA	
1610	4716	3105	UCA TFLAG	
1611	4717	6201	CDF 0	
1612	4720	7340	CLA CLL CMA	
1613	4721	1131	TAD ADR1	
1614	4722	3526	UCA I TAPEK1	
1615	4723	1514	TAD I RDSIZ	
1616	4724	7041	CIA	
1617	4725	3527	UCA I TAPEK2	
1620	4726	6711	MTCR	
1621	4727	5326	JMP .-1	
1622	4730	1152	TAD COMNDW	
1623	4731	6716	MTLC	
1624	4732	7200	CLA	
1625	4733	6721	MTTR	
1626	4734	5333	JMP .-1	
1627	4735	1130	TAD K0010	
1630	4736	6722	MTGO	
1631	4737	6141	LINC	
1632			Lmode	
1633	0740	0000	EXIT2, 0000	
1634			Pmode	
1635	4741	6706	MAGTAP, MTRS	/INTERRUPTS TO HERE WHEN
1636	4742	6712	MTAF	/READING TAPE.
1637	4743	5104	UCA STATUS	
1640	4744	1104	TAD STATUS	

1641	4745	6141	LINC	
1642			LMODE	
1643	0746	1560	BCL I	
1644	0747	7677	7677	
1645	0750	0002	POP	
1646			PMODE	
1647	4751	7450	SNA	
1650	4752	5367	JMP BLKOK	
1651	4753	7200	CLA	
1652	4754	1120	TAD COPY	
1653	4755	7450	SNA	
1654	4756	5522	JMP I XITATE	/(JMP EXIT8)
1655	4757	6201	CDF 0	
1656	4760	7200	CLA	
1657	4761	1115	TAD WRITAP	
1660	4762	3517	UCA I VECTOR	
1661	4763	6141	LINC	
1662			LMODE	
1663	0764	6651	JMP WRITFL	
1664	0765	0002	POP	
1665			PMODE	
1666	4766	4500	REST	
1667	4767	6201	BLKOK, CDF 0	
1670	4770	7300	CLA CLL	
1671	4771	1112	TAD LOBLOK	
1672	4772	1110	TAD UNO	
1673	4773	3112	UCA LOBLOK	
1674	4774	7004	NAL	
1675	4775	1111	TAD HIBLOK	
1676	4776	3111	UCA HIBLOK	
1677	4777	5523	JMP I SW1	
1700	5000	7200	CNTUE, CLA	
1701	5001	1115	TAD WRITAP	
1702	5002	3517	UCA I VECTOR	
1703	5003	6141	LINC	
1704			LMODE	
1705	1004	6660	JMP WRIT	
1706	1005	0002	POP	
1707			PMODE	
1710	5006	7410	SKP	
1711	5007	2105	EXIT8, ISZ TFLAG	
1712	5010	4500	REST	
1713	5011	6706	MGTAP2, MTR8	/INTERRUPTS TO HERE
1714	5012	6712	MTAF	/WHEN WRITING THE
1715	5013	6201	CDF 0	/COPY TAPE.
1716	5014	7200	CLA	
1717	5015	1116	TAD REETAP	
1720	5016	3517	UCA I VECTOR	
1721	5017	2105	ISZ TFLAG	
1722	5020	4500	REST	
1723			LMODE	
1724	1021	1000	REWIND, LOA	/REWIND TAPE ROUTINE.
1725	1022	0000	0	
1726	1023	5051	STC EXIT9	
1727	1024	0002	POP	
1730			PMODE	
1731	5025	6711	MTR8	
1732	5026	5225	JMP .-1	
1733	5027	1252	TAD RWU0	
1734	5030	6716	MTLC	
1735	5031	6721	MTR8	
1736	5032	5231	JMP .-1	
1737	5033	6722	MTGO	

1740	5034	7200	CLA	
1741	5035	1120	TAD COPY	
1742	5036	7450	SNA	
1743	5037	5250	JMP EX9	
1744	5040	7200	CLA	
1745	5041	6711	MTCH	
1746	5042	5241	JMP .-1	
1747	5043	1253	TAD RWU1	
1750	5044	6716	MTLC	
1751	5045	6721	MTTR	
1752	5046	5245	JMP .-1	
1753	5047	6722	MTGO	
1754	5050	6141	EX9, LINC	
1755			LMODE	
1756	1051	0000	EXIT9, 0	
1757	1052	0017	RWU0, 0017	
1760	1053	1017	RWU1, 1017	
1761	1054	1000	EBCDIC, LDA	/EBCDIC TO ASCII
1762	1055	0000	0	/CONVERSION ROUTINE.
1763	1056	5116	STC EXIT3	
1764	1057	0071	SET I 11	
1765	1060	2047	2047	
1766	1061	0070	SET I 10	
1767	1062	2003	2003	
1770	1063	0644	DATFLD, LDF 4	
1771	1064	1030	NXTCHR, LDA I 10	
1772	1065	0643	LDF 3	
1773	1066	1560	BCL I	
1774	1067	7400	7400	
1775	1070	0470	AZE I	
1776	1071	7063	JMP DATFLD	
1777	1072	1560	BCL I	
2000	1073	7700	7700	
2001	1074	3117	ADD TBLADR	
2002	1075	5077	STC ASCII	
2003	1076	1000	LDA	
2004	1077	0000	ASCII, 0000	
2005	1100	1460	SAE I	
2006	1101	0375	375	
2007	1102	7104	JMP .+2	
2010	1103	7114	JMP BLANK	
2011	1104	1071	STA I 11	
2012	1105	1460	SAE I	
2013	1106	0215	215	/CR
2014	1107	7063	JMP DATFLD	
2015	1110	1020	LDA I	
2016	1111	0212	212	/LF
2017	1112	1071	STA I 11	
2020	1113	7063	JMP DATFLD	
2021	1114	0011	BLANK, CLR	
2022	1115	1071	STA I 11	
2023	1116	0000	EXIT3, 0000	/END OF EBCDIC TO ASCII
2024	1117	1355	TBLADR, TABLE	/CONVERSION ROUTINE.
2025	1120	5141	TYPOUT, STC TEMP3	/PRINT ROUTINE.
2026	1121	1000	LDA	/ALL PRINTING COMES
2027	1122	0000	0	/THROUGH HERE.
2030	1123	5140	STC EXIT7	
2031	1124	0002	PDP	
2032			PMODE	
2033	5125	1106	TAD PFLAG	
2034	5126	7450	SNA	
2035	5127	5325	JMP .-2	
2036	5130	7200	CLA	

2037	5131	5106	UCA PFLAG	
2040	5132	1535	TAD I TEM3	
2041	5133	3107	UCA CHAR	
2042	5134	1507	TAD I CHAR	
2043	5135	6046	TLS	
2044	5136	2107	ISZ CHAR	
2045	5137	6141	LINC	
2046			LMODE	
2047	1140	00	EXIT7, 0	
2050	1141	0000	TEMP3, 0	
2051	1142	7021	FINISH, JMP REWIND	/TO HERE WHEN
2052	1143	0002	PDP	/PROCESSING IS COMPLETE.
2053			Pmode	
2054	5144	7200	CLA	
2055	5145	1106	TAD PFLAG	
2056	5146	7450	SNA	
2057	5147	5345	JMP .-2	
2060	5150	6002	IOF	
2061	5151	6141	LINC	
2062			LMODE	
2063	1152	0643	LDF 3	
2064	1153	0076	SET I 16	
2065	1154	0701	0701	
2066	1155	0077	SET I 17	
2067	1156	7300	7300	
2070	1157	6016	JMP 16	
2071			Pmode	
2072	5160	6036	KBRD, KRB	/INTERRUPTS TO HERE WHEN
2073	5161	6141	LINC	/SOMETHING IS TYPED ON
2074			LMODE	/THE KEYBOARD.
2075	1162	1460	SAE I	/WAS IT AN F FOR
2076	1163	0206	206	/FIND NEXT FILE?
2077	1164	7230	JMP NXTTST	/NO
2100	1165	1020	LDA I	/YES, RESET SWITCH.
2101	1166	0236	ADOFF	
2102	1167	0640	LDF 0	
2103	1170	1040	STA	
2104	1171	2205	VECCLK12000	
2105	1172	0015	HTA	
2106	1173	1560	BCL I	
2107	1174	4040	4040	
2110	1175	0014	ATR	
2111	1176	0002	PDP	
2112			Pmode	
2113	5177	7200	CLA	
2114	5200	1105	TAD TFLAG	
2115	5201	7450	SNA	
2116	5202	5200	JMP .-2	
2117	5203	6002	IOF	
2120	5204	4503	API	
2121	5205	5215	JMP CHEKFL	
2122	5206	6141	LINC	
2123			LMODE	
2124	1207	6706	SEARCH, JMP REED	
2125	1210	0002	PDP	
2126			Pmode	
2127	5211	7200	CLA	
2130	5212	1105	TAD TFLAG	
2131	5213	7450	SNA	
2132	5214	5212	JMP .-2	
2133	5215	7200	CHEKFL, CLA	
2134	5216	1104	TAD STATUS	
2135	5217	6141	LINC	

2136			LMODE	
2137	1220	1560	BCL I	
2140	1221	7677	7677	
2141	1222	1040	STA	
2142	1223	1555	STAS	
2143	1224	1460	SAE I	
2144	1225	0100	100	
2145	1226	7207	JMP SEARCH	
2146	1227	6463	JMP CONVRT	
2147	1230	1460	NXTTST, SAE I	/WAS IT A G FOR
2150	1231	0207	207	/FIND NEXT GROUP
2151	1232	7323	JMP DELETE	/NO
2152	1233	1020	LDA I	/YES
2153	1234	0236	ADOFF	
2154	1235	0640	LDF 0	
2155	1236	1040	STA	
2156	1237	2205	VECCLK12000	
2157	1240	0015	MTA	
2160	1241	1560	BCL I	
2161	1242	4040	4040	
2162	1243	0014	ATR	
2163	1244	1000	LDA	
2164	1245	1337	UFLD	
2165	1246	1120	ADA I	
2166	1247	0002	0002	
2167	1250	1560	BCL I	
2170	1251	0011	0011	
2171	1252	1620	BSE I	
2172	1253	0004	0004	
2173	1254	1040	STA	
2174	1255	1337	UFLD	
2175	1256	4344	STC PAK	
2176	1257	0002	POP	
2177			PMODE	
2200	5260	7200	CLA	
2201	5261	1105	TAD TFLAG	
2202	5262	7450	SNA	
2203	5263	5261	JMP .-2	
2204	5264	6002	IOF	
2205	5265	4503	API	
2206	5266	5276	JMP CHEKF	
2207	5267	6141	LINC	
2210			LMODE	
2211	1270	6706	FIND, JMP REED	
2212	1271	0002	POP	
2213			PMODE	
2214	5272	7200	CLA	
2215	5273	1105	TAD TFLAG	
2216	5274	7450	SNA	
2217	5275	5273	JMP .-2	
2220	5276	7200	CHEKF, CLA	
2221	5277	1104	TAD STATUS	
2222	5300	6141	LINC	
2223			LMODE	
2224	1301	1560	BCL I	
2225	1302	7677	7677	
2226	1303	1040	STA	
2227	1304	1555	STAS	
2230	1305	1460	SAE I	
2231	1306	0100	100	
2232	1307	7311	JMP .+2	
2233	1310	6463	JMP CONVRT	
2234	1311	7334	JMP GRPCHN	

2235	1312	1000	LDA	
2236	1313	1567	GROUP	
2237	1314	1440	SAE	
2240	1315	1565	IGROUP	
2241	1316	7320	JMP .+2	
2242	1317	7270	JMP FIND	
2243	1320	5565	STC IGROUP	
2244	1321	0640	LDF 0	
2245	1322	6516	JMP ENTR	
2246	1323	1460	DELETE, SAE I	/WAS IT A D
2247	1324	0204	204	/FOR DELETE THIS
2250	1325	7332	JMP EXITS	/FILE IF A COPY
2251	1326	0011	CLR	/WAS SPECIFIED.
2252	1327	0640	LDF 0	
2253	1330	1040	STA	
2254	1331	2120	COPY12000	
2255	1332	0002	EXITS, PDP	
2256			PMODE	
2257	5333	4500	REST	
2260			LMODE	
2261	1334	1000	GRPCHN, LDA	/TO HERE TO DECIPHER
2262	1335	0000	0	/THE GROUP NUMBER.
2263	1336	5354	STC EXIT4	
2264	1337	0644	DFLD, LDF 4	
2265	1340	0047	SET 7	
2266	1341	1600	IXSEVN	
2267	1342	1027	LDA I 7	
2270	1343	1560	BCL I	
2271	1344	7760	7760	
2272	1345	0250	NOL 8	
2273	1346	5572	STC TEMP	
2274	1347	1027	LDA I 7	
2275	1350	1560	BCL I	
2276	1351	7400	7400	
2277	1352	3572	ADD TEMP	
2300	1353	5567	STC GROUP	
2301	1354	0000	EXIT4, 0000	
2302	1355	0240	TABLE, 240	/SPACE 100
2303	1356	0301	301	/A 301
2304	1357	0302	302	/B 302
2305	1360	0303	303	/C 303
2306	1361	0304	304	/D 304
2307	1362	0305	305	/E 305
2310	1363	0306	306	/F 306
2311	1364	0307	307	/G 307
2312	1365	0310	310	/H 310
2313	1366	0311	311	/I 311
2314	1367	0215	215	/ 12 ASCII CR.
2315	1370	0256	256	/.
2316	1371	0334	334	/ 14
2317	1372	0250	250	/(115
2320	1373	0253	253	/+ 116
2321	1374	0334	334	/ 17
2322	1375	0246	246	/& 120
2323	1376	0312	312	/J 321
2324	1377	0313	313	/K 322
2325	1400	0314	314	/L 323
2326	1401	0315	315	/M 324
2327	1402	0316	316	/N 325
2330	1403	0317	317	/O 326
2331	1404	0320	320	/P 327
2332	1405	0321	321	/Q 330
2333	1406	0322	322	/R 331

2334	1407	0241	241	/1	132
2335	1410	0244	244	/8	133
2336	1411	0252	252	/*	134
2337	1412	0251	251	/)	135
2340	1413	0273	273	/1	136
2341	1414	0334	334	/	37
2342	1415	0255	255	/~	140
2343	1416	0257	257	//	141
2344	1417	0323	323	/S	342
2345	1420	0324	324	/T	343
2346	1421	0325	325	/U	344
2347	1422	0326	326	/V	345
2350	1423	0327	327	/W	346
2351	1424	0330	330	/X	347
2352	1425	0331	331	/Y	350
2353	1426	0332	332	/Z	351
2354	1427	0334	334	/	52
2355	1430	0254	254	/,	153
2356	1431	0245	245	/X	154
2357	1432	0000	000	/UNDLINE	155
2360	1433	0334	334	/	56
2361	1434	0277	277	/?	157
2362	1435	0260	260	/0	360
2363	1436	0261	261	/1	361
2364	1437	0262	262	/2	362
2365	1440	0263	263	/3	363
2366	1441	0264	264	/4	364
2367	1442	0265	265	/5	365
2370	1443	0266	266	/6	366
2371	1444	0267	267	/7	367
2372	1445	0270	270	/8	370
2373	1446	0271	271	/9	371
2374	1447	0272	272	/1	172
2375	1450	0334	334	/	73
2376	1451	0334	334	/	74
2377	1452	0375	375	/	75
2400	1453	0275	275	/*	176
2401	1454	0242	242	/"	177
2402	1455	0000	000	/UNDERLINE TO ZEROS.	
2403	1456	0301	301	/A	
2404	1457	0302	302	/B	
2405	1460	0303	303	/C	
2406	1461	0304	304	/D	
2407	1462	0305	305	/E	
2410	1463	0306	306	/F	
2411	1464	0307	307	/G	
2412	1465	0310	310	/H	
2413	1466	0311	311	/I	
2414	1467	0321	321	/J	
2415	1470	0322	322	/K	
2416	1471	0323	323	/L	
2417	1472	0324	324	/M	
2420	1473	0325	325	/N	
2421	1474	0326	326	/O	
2422	1475	0327	327	/P	
2423	1476	0330	330	/Q	
2424	1477	0331	331	/R	
2425	1500	0342	342	/S	
2426	1501	0343	343	/T	
2427	1502	0344	344	/U	
2430	1503	0345	345	/V	
2431	1504	0346	346	/W	
2432	1505	0347	347	/X	

2433	1506	0350	350	/Y
2434	1507	0351	351	/Z
2435	1510	0100	100	/33
2436	1511	0012	12	/34
2437	1512	0100	100	/35
2440	1513	0100	100	/36
2441	1514	0100	100	/37
2442	1515	0100	100	/40, SPACE
2443	1516	0152	152	/1
2444	1517	0177	177	/"
2445	1520	0173	173	/43 NOT POSSIBLE 43 IS CH.
2446	1521	0133	133	/S
2447	1522	0154	154	/X
2450	1523	0120	120	/8
2451	1524	0175	175	/
2452	1525	0115	115	/(
2453	1526	0135	135	/)
2454	1527	0154	154	/*
2455	1530	0116	116	/+
2456	1531	0153	153	/,
2457	1532	0140	140	/-
2460	1533	0113	113	/.
2461	1534	0141	141	//
2462	1535	0360	360	/0
2463	1536	0361	361	/1
2464	1537	0362	362	/2
2465	1540	0363	363	/3
2466	1541	0364	364	/4
2467	1542	0365	365	/5
2470	1543	0366	366	/6
2471	1544	0367	367	/7
2472	1545	0370	370	/8
2473	1546	0371	371	/9
2474	1547	0172	172	/1
2475	1550	0136	136	/1
2476	1551	0012	12	/74
2477	1552	0176	176	/"
2500	1553	0100	100	/
2501	1554	0157	157	/?
2502	1555	0000	STAS, 000	
2503	1556	0000	DIVSOR, 0	
2504	1557	0100	K100, 100	
2505	1560	0000	SWITCH, 0	
2506	1561	0000	SW2, 0	
2507	1562	0001	ONE, 1	
2510	1563	0002	TWO, 2	
2511	1564	0004	K4, 4	
2512	1565	0000	IGROUP, 0	
2513	1566	0000	HIGRUP, 0	
2514	1567	0000	GROUP, 0	
2515	1570	0000	FILHI, 0	
2516	1571	0000	FILCNT, 0	
2517	1572	0000	TEMP, 0	
2520	1573	0000	TEMP4, 0	
2521	1574	0000	RCDSIZ, 0	
2522	1575	0000	ADRESS, 0	
2523	1576	0000	RCDSKP, 0	
2524	1577	0000	IXTEN, 0	
2525	1600	0000	IXSEVN, 0	
2526	1601	0000	MCHAN, 0	
2527	1602	0000	CHAN, 0	
2530			SEGMENT 3	
2531	0000	0000	ANS4, 0	

2532			*20	
2533	0020	0215	215	/CARRIAGE RETURN
2534	0021	0212	212	/LINEFEED
2535	0022	0240	240	
2536	0023	0240	240	
2537	0024	0240	240	
2540	0025	0307	307	/G
2541	0026	0322	322	/K
2542	0027	0317	317	/O
2543	0030	0325	325	/U
2544	0031	0320	320	/P
2545	0032	0240	240	/
2546	0033	0240	240	/
2547	0034	0240	240	/
2550	0035	0240	240	/
2551	0036	0302	302	/B
2552	0037	0314	314	/L
2553	0040	0313	313	/K
2554	0041	0240	240	/
2555	0042	0316	316	/N
2556	0043	0317	317	/O
2557	0044	0256	256	/.
2560	0045	0215	215	/CR
2561	0046	0212	212	/LF
2562	0047	0000	0	/ENDS TYP0UT
2563			*50	
2564	0050	0000	0	
2565			*600	
2566	0600	0215	215	
2567	0601	0212	212	
2570			*630	
2571	0630	0215	215	
2572	0631	0212	212	
2573	0632	0240	240	
2574	0633	0240	240	
2575	0634	0320	320	/P
2576	0635	0301	301	/A
2577	0636	0322	322	/R
2600	0637	0311	311	/I
2601	0640	0324	324	/T
2602	0641	0331	331	/Y
2603			*660	
2604	0660	0215	215	
2605	0661	0212	212	
2606	0662	0240	240	
2607	0663	0240	240	
2610	0664	0240	240	
2611	0665	0240	240	
2612	0666	0240	240	
2613	0667	0305	305	/E
2614	0670	0317	317	/O
2615	0671	0306	306	/F
2616	0672	0000	0	
2617	0673	0000	0	
2620	0674	0000	0	
2621	0675	0000	0	
2622	0676	0000	0	
2623	0677	0000	0	
2624	0700	0000	0	
2625	0701	0000	0	
2626	0702	0215	215	
2627	0703	0212	212	
2630	0704	0212	212	

2631	0705	0212	212	
2632	0706	0212	212	
2633	0707	0212	212	
2634	0710	0212	212	
2635	0711	0212	212	
2636	0712	0212	212	
2637	0713	0212	212	
2640	0714	0212	212	
2641	0715	0000	0	/ENDS TYP0UT
2642	0716	0215	FILNUM, 215	
2643	0717	0212	212	
2644	0720	0240	240	
2645	0721	0240	240	
2646	0722	0240	240	
2647	0723	0240	240	
2650	0724	0240	240	
2651	0725	0240	240	
2652	0726	0240	240	
2653	0727	0240	240	
2654	0730	0306	306	/F
2655	0731	0311	311	/I
2656	0732	0314	314	/L
2657	0733	0305	305	/E
2660	0734	0240	240	
2661	0735	0316	316	/N
2662	0736	0325	325	/U
2663	0737	0315	315	/M
2664	0740	0302	302	/B
2665	0741	0305	305	/E
2666	0742	0322	322	/R
2667			*1000	
2670	1000	0604		
2670	1001	1107		
2670	1002	1124		
2670	1003	0114		
2670	1004	4024		
2670	1005	1740		
2670	1006	0116		
2670	1007	0114		
2670			MESS1, TEXT ZFDIGITAL TO ANALOG	
2671	1010	1707		
2671	1011	4306		
2671	1012	2205		
2671	1013	2425		
2671	1014	2216		
2671	1015	4020		
2671	1016	2217		
2671	1017	0722		
2671	1020	0115		
2671			FRETURN PROGRAM	
2672	1021	4043		
2672				
2673	1022	4740		
2673	1023	4347		
2673				
2674	1024	4043		
2674	1025	4040		
2674	1026	4040		
2674	1027	5024		
2674	1030	3120		
2674	1031	0540		
2674	1032	1411		
2674	1033	1605		

2674	1034	0605
2674	1035	0504
2674	1036	4024
2674	1037	1740
2674	1040	0317
2674	1041	1624
2674	1042	1116
2674	1043	2505
2674	1044	5140
2674	1045	3400

(TYPE LINEFEED TO CONTINUE) \Z

2674	1046	1040
2675	1047	2711
2675	1050	1414
2675	1051	4001
2675	1052	4003
2675	1053	1720
2675	1054	5140
2675	1055	0205
2675	1056	4015
2675	1057	0104

MESS4, TEXT JH WILL A COPY BE MADE?

2676	1060	0577
2676	1061	4347
2676	1062	4011
2676	1063	0640
2676	1064	2317
2676	1065	4024
2676	1066	3120
2676	1067	0540
2676	1070	0340
2676	1071	4074

IF SO TYPE C <01

2676	1072	6061
2677	1073	4347
2677	1074	4001
2677	1075	1604
2677	1076	4016
2677	1077	0527
2677	1100	4022
2677	1101	0505
2677	1102	1440
2677	1103	1617
2677	1104	5640
2677	1105	7460

AND NEW REEL NO. <06

2677	1106	6643
2700	1107	4740
2700	1110	2205
2700	1111	2425
2700	1112	2216
2700	1113	4006
2700	1114	2205
2700	1115	2125
2700	1116	0516

RETURN FREQUENCY

2701	1117	0351
2701	1120	4347
2701	1121	4050
2701	1122	0622
2701	1123	0115
2701	1124	0523
2701	1125	4020

2701	1126	0522
2701	1127	4023
2701	1130	0503
2701	1131	1716
2701		
2702	1132	0451
2702	1133	4347
2702	1134	4061
2702	1135	5640
2702	1136	6460
2702	1137	6013
2702	1140	1032
2702	1141	4040
2702	1142	6256
2702	1143	4061
2702	1144	6060
2702	1145	1310
2702		
2703	1146	5243
2703	1147	4740
2703	1150	6356
2703	1151	4061
2703	1152	6013
2703	1153	1032
2703	1154	4040
2703	1155	4064
2703	1156	5640
2703	1157	6113
2703		
2704	1160	1032
2704	1161	4347
2704	1162	4065
2704	1163	5640
2704	1164	6160
2704	1165	6010
2704	1166	3240
2704	1167	4040
2704	1170	6656
2704	1171	4005
2704	1172	3024
2704	1173	0522
2704	1174	1601
2704		
2705	1175	1440
2705	1176	4347
2705	1177	4074
2705		
2706	1200	6061
2706	1201	4347
2706	1202	4004
2706	1203	1126
2706	1204	1104
2706	1205	0504
2706	1206	4002
2706	1207	3140
2706	1210	6155
2706	1211	6460
2706	1212	7166
2706		
2707	1213	4040
2707	1214	4347
2707	1215	4050
2707	1216	1116

(FRAMES PER SECOND)

1. 400KHZ 2. 100KHZ

3. 10KHZ 4. 1KHZ

5. 100HZ 6. EXTERNAL

<01

DIVIDED BY 1-4096

2707	1217	0314
2707	1220	2504
2707	1221	0540
2707	1222	1405
2707	1223	0104
2707	1224	1116
2707	1225	0740
2707	1226	3205
2707	1227	2217
2707	1230	0523
2710	1231	5143
2710	1232	4740
2710	1233	7460
2711	1234	6443
2711	1235	4740
2711	1236	0521
2711	1237	2501
2711	1240	1423
2711	1241	4024
2711	1242	1005
2711	1243	4022
2711	1244	0524
2711	1245	2522
2711	1246	1640
2711	1247	0622
2711	1250	0521
2711	1251	2505
2711	1252	1603
2711	1253	3156
2711	1254	3400
2712		
2713		

(INCLUDE LEADING ZEROES)

<04

EQUALS THE RETURN FREQUENCY.\J
LISTAP-1

AAPDL 0254
ADOFF 0236
ADRESS 5575
ADR1 0131
ANS4 6000
APDL 0401
API 4503
APION 6006
ASCII 5077
ATOEB 4234
AVECT 0400
BINARY 4501
BLANK 5114
BLKOK 4767
CHAN 5602
CHAR 0107
CHEKF 5276
CHEKFL 5215
CLK 0420
CLOCK 4502
CNTUE 5000
COMND 0134
COMNOF 0133
COMNDW 0132
CONVRT 4463
COPY 0120
COPY1 0121
DACON 4552
DATFLD 5063
DECSIN 2036
DECODE 4022
DELETE 5323
DFLO 5337
DISPLA 2020
DIVSOR 5556
EBCDIC 5054
ENDFIL 6660
ENTR 4516
EXIT 4643
EXIT1 4705
EXIT2 4740
EXIT3 5116
EXIT4 5354
EXIT5 5332
EXIT6 2035
EXIT7 5140
EXIT8 5007
EXIT9 5051
EX9 5050
FILCNT 5571
FILHI 5570
FILNUM 6716
FIND 5270
FINISH 5142
FLAG 1275
FRAME 4377
GROUP 5567
GRPCMN 5334
GRPNUM 6600
HEADR 6050
HIBLOK 0111
HIGRUP 5566
IGROUP 5565

INTRPT	0403
IXSEVN	5600
IXTEN	5577
KBRD	5160
K0010	0130
K0037	0402
K0100	0443
K0300	2446
K100	5557
K4	5564
K5100	2445
LOAD	4674
LOBLOK	0112
MAGTAP	4741
MCHAN	5601
MCLA	6702
MESS1	7000
MESS4	7046
MGTAP2	5011
MTAF	6712
MTCM	6714
MTCR	6711
MTGO	6722
MTLC	6716
MTRC	6724
MTRS	6706
MTSF	6701
MTTR	6721
NDEX	4242
NEWFIL	4105
NOPRTY	4441
NUMBER	0444
NXTCHR	5064
NXTDGT	2045
NXTTST	5230
ONE	5562
PAK	4344
PARAMS	4176
PARITY	6630
PDL	0265
PFLAG	0106
POINTC	0124
POINTN	0125
POINTR	0223
PRINT	4475
PUSHJ	6760
QR	7063
QU	7000
RCDISZ	5574
RCDSKP	5576
RDSIZ	0114
REED	4706
REETAP	0116
REFIL	4340
RENTER	4260
REST	4500
RESTI	6771
RETURN	2067
REWIND	5021
RFLD	6773
RSTK	6774
RTAP	4310
RVEC	6775

RWU0	5052
RWU1	5053
SEARCH	5207
SMLV	6772
SRVICE	0255
SSTK	6776
STAS	5555
STATUS	0124
SVEC	6777
SWITCH	5560
SW1	0123
SW2	5561
TABLE	5355
TABLE1	5455
TAPE	4275
TAPEK1	0126
TAPEK2	0127
TBLAUR	5117
TEMP	5572
TEMP1	2057
TEMP2	2052
TEMP3	5141
TEMP4	5573
TEM3	0135
TEN	0113
TFLAG	0105
TTY	0240
TWO	5563
TYPOUT	5120
UDADUR	1273
UDADRS	1310
UDARND	1222
UDBOX	1304
UDCNT	1277
UDCON1	1311
UDDO	1230
UDGET	1306
UDHIGH	1300
UDHSUB	1302
UDLOOP	1272
UDLOW	1301
UDLSUB	1303
UDOUT	1246
UDPRNT	1200
UDPTH	1307
UDSPCE	1274
UDTEML	1305
UDTWO	1276
UNO	0110
VECCLK	0205
VECT	0200
VECTOR	0117
WAIT	4410
WRIT	4660
WRITAP	0115
WRITFL	4651
XITATE	0122
XXXX	6704